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POSTOPERATIVE SWELLING OF THE UPPER EXTREMITY, FOLLOWING OPERATIONS ON THE BREAST AND AXILLA.

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FOLLOWING the radical operation for carcinoma of the breast, extensive swelling of the upper extremity has been noted by various surgeons in a percentage of cases sufficiently large to make the subject one worthy of careful study.

This complication, while not of serious import to life, except where indicative of cancer extension, is one which affects mobility, and in its more advanced forms causes the individual serious inconvenience.

Almost invariably patients are informed previous to operation regarding interference with function due to removal of the pectoral muscles, but as a rule little is said regarding swelling of the extremity. This is probably due to the fact that it is an occurrence as little expected by the surgeon as by the patient.

In looking up the subject of this particular type of postoperative edema, one is at once impressed by the limited number of articles on the subject, and at the scant attention paid to it in the textbooks. On the other hand, the literature on postoperative edema of the lower extremity is large.

A moderate amount of swelling might be expected to follow an operation involving a thorough dissection of the axilla, but the extensive and persistent edema so troublesome in some cases, and entirely absent in others, must be caused by some error in technique on the part of the operator, or some condition either anatomical or pathological not thoroughly understood.

The writer's attention was first called to this subject in 1912, when, following a Halsted's operation for carcinoma of the breast, an extensive swelling of the upper extremity developed within the first four weeks. This was laid to the fact that the incision had been carried too low across the insertion of the pectoralis major muscle, and the resulting scar had developed a cicatricial band extending along the upper axillary fold limiting the abduction of the arm to about 50 per cent. of normal, and presumably also causing pressure on the lymphatic or venous circulation. This scar was excised and relief secured so far as abduction was concerned. The edema of the extremity persisted. This, while annoying, did not interfere particularly with the mobility, yet when combined with muscular weakness, caused by the removal of the pectorals, presented a very unsatisfactory result. As this happened, fortunately, to be the first case presenting this complication, stress was naturally laid on the restricting band as the cause of the swelling. This was associated with a slight in-

fection, so slight in fact that little attention was paid to it at the time.

August 22, 1921, the patient again reported for examination. The swelling of the arm and forearm still persisted, amounting to about 6 cm. at the middle of the arm. The cicatricial band had practically entirely disappeared. Abduction at this time was within 10 per cent. of normal. The patient complained bitterly of the inconvenience and pain which she associated with the swelling.

It is interesting at this point to note that in 1911 the pathologist reported that the tumor removed did not present a distinct picture of carcinoma, but was typed as precancerous. This has a distinct bearing on the longevity.

His article, referred to above, and his recent presentation of the topic before the American Congress of Surgeons in Washington, present the most advanced views on the subject.

ANATOMICAL CONSIDERATIONS REGARDING ETIOLOGY.

(*a*) *The Axillary Vein.*—The axillary vein has always been most carefully avoided in all operations involving the axilla. This has become axiomatic. Paralleling in importance the femoral vein, obstruction of which from pressure, thrombi or pathological invasion, produces a marked swelling of the lower extremity, usually of moderate duration unless caused by cancer, trauma or senile changes, the axillary vein has received little consideration because obstruction here is much less frequent than in the case of the femoral.

FIG. 1.—Postoperative edema. Halsted's operation. Modified incision. Cancer involved breast and anterior axillary fold.

Pioneer work on the subject of postoperative edema of the upper extremity has been done by Dr. William S. Halsted of Baltimore, and I approach a discussion of the subject with some hesitancy, feeling that what I may say will be largely a résumé of what he has done.

In a personal communication, dated August 30, 1921, asking for information and literature, he states: "I am very happy to learn that you are trying to ascertain the cause of the edema of the arm following the radical operation for cancer of the breast. I am sorry that I cannot refer you to any literature bearing on the subject. I know of none. A paper of mine, entitled Elephantiasis Chirurgica is to appear in the October number of the *Johns Hopkins Bulletin*. In this communication I have expressed the view, based upon a long and comprehensive study of our cases, that *infection* is quite invariably the ultimate cause of the edema."

Certain anatomical peculiarities in the course of the vein, occasionally noted, play little importance when considering etiology.

(*b*) *The Lymphatics.*—The lymphatics of the upper extremity are represented by two sets. These are typed as superficial and deep. It is obvious that in a complete dissection of the axilla the normal lymphatic circulation must be interfered with to a greater or less extent, depending on the course of the lymphatics. This undoubtedly varies in different individuals, and may be an etiological factor of importance, and perhaps account for its comparative rarity, or at least its infrequency in a severe and persistent form. Careful examination of almost any one of these cases gives one the impression of lymphatic rather than venous obstruction. There

is not the extreme pitting so characteristic of the latter condition, and the tissues opposed to the examining hand possess a certain firmness of texture, suggesting lymphatic rather than venous obstruction.

(c) *The Artery.*—Consideration of this phase of the subject would not be complete without reference to the work of Rene Leriche on the "Peri-arterial Sympathetics." He states that when you remove the sheath of an artery, the brachial for instance, you see, just at the moment its external layer is pinched, the vessel contracts, its pulsation stops at once and its size diminishes. If you excise the cellular layer, the diminution will progressively reach the third or the fourth of the normal artery. The arterial contraction usually causes the pulse to disappear, but it does not altogether interrupt the circulation. Other vasomotor phenomena are cynaosis, local blue edema or large white edema reaching the origin of the limb without any signs of phlebitis or arterial obliteration. This may be observed surgically when the sympathetical irritation is manifest, for instance, in the case of cervical rib, or in certain subclavian obliterations. He suggests peri-arterial sympathectomy for the relief of this condition, and reports a number of successful cases.

I have mentioned this topic at this time because I think it serves to emphasize the importance of careful dissection of the axilla and avoidance of trauma to the many important structures therein. It is also possible that we have previously given too little consideration to the peri-arterial sympathetics, and the far-reaching results following injury to them. I think Leriche has performed a distinct service in calling our attention to this subject.

PATHOLOGICAL CONSIDERATIONS REGARDING ETIOLOGY.

(a) *Carcinoma.*—Inoperable cases almost always present extensive swelling of the upper extremity. This is due to invasion of the vessels in the axillary or sub-clavicular region with cancer cells or to pressure from the masses of cancerous tissue. This very fact seems to indicate rather conclusively that all these elements singly or combined play an important part in the etiology. The same thing may be said of metastases. So it is undoubtedly true that we may have postoperative swelling without infection.

FIG. 2.—Postoperative edema. Case, infection axilla, mentioned in text. No breast involvement. Anterior view.

(b) *Infection.* Wherever infection is present in any part of the body, there we have swelling usually of the edematous type. It would be almost impossible to say in any specific instance that no infection had existed in so large a wound

as that, which is associated with the removal of breast carcinoma. Even a slight infection almost imperceptible might give rise to swelling of a considerable extent if located in an area adjacent to important lymphatic or venous structures. It is undoubtedly a very important etiological factor. Halsted types the condition as "Surgical Elephantiasis," and this term implies infection, for elephantiasis, according to Matas, quoted in Halsted's article, is characterized by a chronic inflammatory fibromatosis or hypertrophy of the hypodermal and dermal connective tissue, and is preceded by and associated with lymphatic and venous stasis. Edema may exist for many years in the extremities without causing any fibromatosis or hyperplasis of the connective tissue of the parts. Something more than lymph stasis is required, and that something more is infection with pathologic organisms, and especially those of the streptococcal type. It is questionable whether the postoperative swelling which we are discussing ever reaches the stage of fibrosis mentioned by Matas.

One of the most extensive examples of edema of the upper extremity in our experience was that of a patient who applied for treatment at the New Haven Dispensary in February, 1922. This had developed following an operation on the axilla, evidently a rather extensive dissection caused by an infection, due probably to skin irritation from wearing a cast which held the arm in abduction.

An interesting point which should be mentioned, however, is the fact that the patient stated that a tumor had been removed. The operation was performed in some New York hospital, the name of which she did not remember, so I was unable to trace the truth of this statement. I believe she had an axillary abscess, which was incised freely and drained. The circumference of the right arm at the mid-point was 5 cm. greater than the left, and of the right forearm 10 cm. greater. Both breasts were normal, and there was no evidence of cervical involvement or other metastases. No limitation of abduction from the scar which was placed low in the axilla.

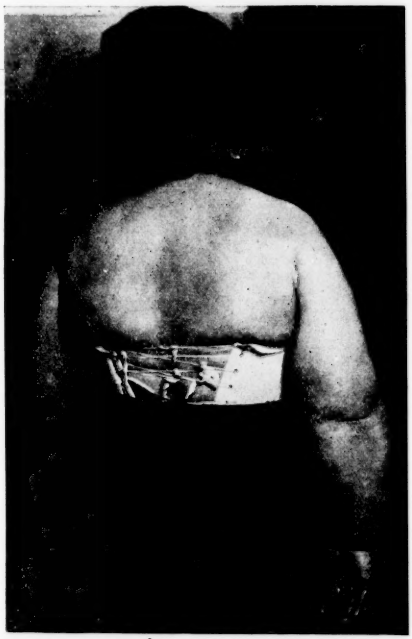

FIG. 3.—Postoperative edema. Case, infection axilla, mentioned in text. No breast involvement. Posterior view.

(*c*) Pressure from scar tissue, either that caused by dissection of the axilla or from cicatricial bands crossing the upper axillary fold due to the character of the incision. I believe this is an important etiological factor. This has been substantiated in our own experience, and in the experience of the Hopkins Clinic, for with the

reduction of this pressure to a minimum, cases of postoperative swelling of the upper extremity have ceased to a very great extent.

This paper would be incomplete without brief reference to the experiments at the Hunterian laboratory conducted at the instance of Dr. Halsted by Dr. F. L. Reichert and Dr. C. Y. Bidwell. In these partial amputations were tried on dogs. All the tissues of the thigh were severed except the femoral artery and vein, the main nerve trunks and the bone. The divided parts were carefully sutured. For seven or eight days there would be slight swelling of the leg below the line of suture. When this had subsided the femoral vein was ligated. No demonstrable increase in the size of the leg occurred after this ligation. Later experiments included also the ligation of the femoral artery with a similar result. Dr. John Morton tells me that beautiful specimens were presented before the American Surgical Association with the vessels of these animals injected, showing the remarkable development of the new circulatory channels in the partially amputated limbs.

Granting from the observations previously made that the two factors most important in the causation of postoperative swelling of the upper extremity are pressure from scar tissue and infection, the question naturally arises as to how this condition can best be avoided. The following suggestions seem pertinent:

First. Incision.—A straight incision commencing from a point below the middle or outer third of the clavicle carried to the upper border of the breast, which it then encircles, seems to accomplish the desired result most satisfactorily. This eliminates the curve over the deltoid and the upper axillary fold. On healing, the scar is practically straight or curves downward towards the axilla in such a way as to give a redundant skin area where most needed, that is, high up in the axilla.

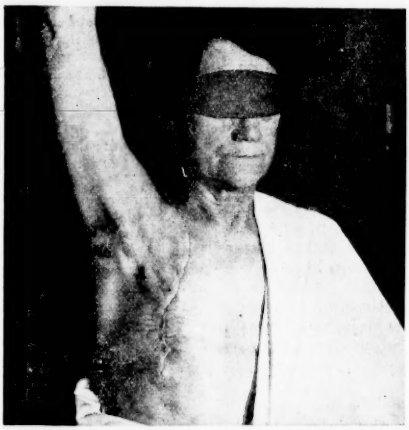

FIG. 4.—Case, Surgical Service, New Haven Hospital. Carcinoma of breast. Incision as suggested in text. Operator, Dr. John Morton.

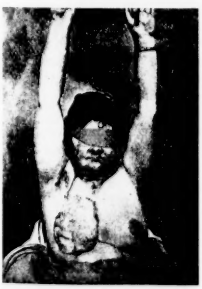

FIG. 5.—Closure as suggested by the late Dr. Halsted.

FIG. 6.—Closure as suggested by the late Dr. Halsted.

Exposure of the insertion of the pectoralis major is easily made, and therefore the main reason for the old incision is eliminated. The dissection of the axilla is as readily completed as formerly.

Second. Dissection.—The dissection of the axilla should be clean cut. All trauma to the axillary structures should be avoided, thus eliminating as far as possible injury to the peri-arterial sympatheties.

Third. Hemostasis.—Most careful attention should be paid to this.

Fourth. Drainage.—Dr. Halsted has suggested the elimination of this. In one case on the surgical service at the New Haven Hospital, a restricting band developed at the point of the drainage incision, but this is the only example of this in our experience. I believe that the average surgeon is safer with drainage, because it affords an outlet for serum as being a useful precaution against infection.

Fifth. Closure without Tension.—The tendency is to do too little skin grafting. The technique at Dr. Halsted's Clinic includes skin grafting and tucking in of the axillary fold in practically all the cases. As he says, this simple change has practically eliminated postoperative swelling. Plastic operations to secure closure should be avoided. This statement is made with full realization of the fact that physicians referring cases as a rule expect complete suture of the wound. This can in the majority of cases be secured; but is it not too often done at the expense of the patient's safety?

IN CONCLUSION.

Postoperative swelling of the upper extremity is caused in the majority of cases by

1. Extension of cancer cells.
2. Pressure of scar tissue and tension on skin flaps.
3. Infection.
4. Trauma to axillary structures during dissection.

It can largely be avoided by

1. Careful asepsis and hemostasis.
2. An incision so placed that on healing it will not exert pressure from scar tissue on the upper portion of the axillary triangle.
3. Elimination of trauma in the dissection of the axilla.
4. The Halsted method of suturing the upper and outer skin flap high in the axilla, thus giving a redundant skin area where most needed.
5. Care in postoperative treatment. The forearm supported by a sling should be placed at right angles to the arm. The binder across the arm and chest should exert little pressure. Passive motion should be commenced early.

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REFERENCES.

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Annals of Surgery, Oct., 1921, Vol. lxxiv, No. 4, p. 385. Some Researches on the Peri-arterial Sympathetics. Rene Leriche, M.D., Lyons, France.

DISCUSSION OF DR. HARTSHORN'S PAPER.

DR. STEPHEN A. MAHONEY, Holyoke: I must congratulate the doctor on the paper he has read. It certainly covers all the points which should be brought out. I don't quite agree with him as to the relative importance of the things causing it. Handley in the *Lancet* in 1909 wrote extensively on this subject. He said that one case out of every six of amputations of the breast was followed by this edema of the upper arm. In his operations he had resected the axillary vein, had done extensive operations in removing the gland, and yet he could not tell in what cases edema would take place and in what cases it wouldn't take place. He said that in the majority of cases where he resected the axillary vein there was no edema. He negatived the blocking of the circulatory system as one of the causes of edema of the upper extremity.

I think Halsted put the importance in the following order: least in importance, interference with the circulation; next, interference with the lymphatic circulation; but the most important, infection—that you can have extensive interference with the circulation or lymphatic system without edema. It is rare to have your operation followed by edema if you have no infection. If you consider the extensive dissection that is necessary in a radical operation on the breast, you can see how difficult it is to avoid infection. I think all use drainage, and the minute we use drainage we are going to have some infection, and also we are liable to have a marginal necrosis high up in the axilla in the majority of cases of amputation for cancer of the breast; and if we have a necrosis we have infection. Therefore infection is present in the majority of the cases, and that may account for Handley's experience in finding that one case of edema occurs in every six cases following radical operation on the breast. I think I agree with him in his classification of the causes,—that the least important is the interference with the circulatory system; that the next in importance is the interference with the lymphatic system, and the most important is infection, which produces interference with the lymphatics.

There has been some work done relative to the relief of this condition. I think there are three operations done and reported by Handley in the *Lancet*. One is the so-called Condoléon operation which is done for elephantiasis of the lower extremity. That operation has been done by Handley in a few cases of this condition, and he reports excellent results.

In another operation by Tuffier of Paris he disarticulates the upper extremity in a bad case, but only where he could get clean flaps. There is no need of disarticulation of the upper extremity unless you can get clean flaps, and that almost negatives that operation except in certain clean cases.

There is another operation reported by Handley, and that is by producing artificial channels out of the unhealthy tissues by the insertion of subcutaneous silk sutures running from the wrist well up

son to the healthy tissues of the chest wall. I think he had five or six cases where he did that operation, and at the time he made his report two of them were practically cured. That is a simple operation—anybody can do it—and the reports from it are encouraging enough to be considered even in cases which are infected, where a simple operation can be done in order to relieve this distressing condition.

DR. HERBERT L. SMITH, Nashua: This paper reminds me of the use of the pectoral muscle as a flap, which I have used many times and has also helped.

As regards binding the arm—for some years I have used no binder for the arm but have had the patient lift her arm over her head on the next day, which can always be done without distress.

In speaking of the edema cases I did bury the tubular silk and with very great success. It gave very nearly complete relief.

DR. STEPHEN A. MAHONEY Holyoke: I might say a word about turning in the flap of the pectoralis major and minor muscles—that is mentioned by Handley, and he says that has no effect at all. It didn't help.

DR. CHARLES A. PORTER, Boston: It has always seemed to me that a piece of muscle without nerve supply would certainly undergo fibrosis.

THE PRESIDENT, DR. CHARLES A. PORTER, Boston: I think we ought to thank our local Committee for one of the most enjoyable meetings we have ever had.

Adjourned.

DIABETES MELLITUS COMPLICATING SURGERY.

BY ARTHUR T. JONES, M.D., F.A.C.S., PROVIDENCE, R. I.

DIABETES MELLITUS, as defined by Osler, is a disorder of carbohydrate metabolism characterized by progressive loss in weight, thirst, and polyuria; and by the persistent excretion of glucose in the urine when an individual is on a diet containing only moderate amounts of carbohydrates or in certain instances even when no carbohydrates are ingested. Fat and protein metabolism becomes secondarily affected during the course of the disease. Diabetes is not an entity but must be considered more as a symptom complex, dependent upon a great variety of causes.

It is not the idea of this paper to take up at any length the medical aspect of diabetes with its complex symptoms, diagnosis, pathology, or treatment; but rather to discuss the relation surgery has to diabetic patients with surgical conditions.

In discussing this problem it is well to review briefly Diabetes Mellitus, first taking up the sugar control in the body. This may be termed the relationship existing between the percentage of blood sugar and urine sugar and the factor which the so-called "renal permeability" or "renal leak point" plays. Growing knowledge shows while normally a kidney is not permeable to blood sugar values of from .07–.15% the threshold or "renal leak point" may be greatly altered in abnormal conditions in one way or another. For example, we may have

1.—Normal blood sugar content with or without glycosuria.

2.—Abnormally high blood sugar content with or without sugar in the urine.

3.—Abnormally low blood sugar content with or without sugar in the urine.

The normal blood sugar is stated as varying from .07–.15%, depending on the diet. The question may be asked whether it is possible to have a glycosuria with a normal blood sugar content. Experimentally this is possible—for lack of better explanation we may say this happens by impairing the renal function and increasing its permeability for sugar. This is so-called renal diabetes, which has no relation to true diabetes.[2]

Next we may have an increase over normal values as given to the blood sugar content without the appearance of sugar in the urine. Here the "threshold renalis," so called, is increased. As for example, in uremia, in which the blood sugar will be found high, often equalling the stage of diabetes—yet no sugar is found in the urine. In severe cases of nephritis also, patients may exerete small quantities of sugar in the urine, frequently giving rise to misapprehension that true diabetes exists. Carbohydrate restrictions in these cases do not appreciably influence the blood sugar content.

Hyperglycemia with glycosuria is the condition one finds in true diabetes. Williams and Humphrey studied the blood sugar level in 127 diabetic cases and found no constant level for the appearance of sugar. Also that there was no constant relation between the height of the "renal threshold" and the duration of the diabetes, although it appears that the threshold rises with increased duration of the disease and advancing years. A rising renal threshold for sugar, in the face of careful dietary treatment, is a serious prognostic sign. In the treatment of diabetes it is desirable to maintain the blood sugar level as nearly normal as possible even though severe restrictions in diet may be necessary or even though the high threshold will permit a more liberal diet without sugar appearing in the urine.

Hypoglycemia with glycosuria according to Langdon Brown[3] who recalls Sir Archibald Garrod defining a group of such cases in which slight quantities of sugar in the urine were found continually, in which variations in the diet had no effect on the glucose output and in some of which the blood sugar had been shown to be diminished rather than increased.

This type of case, however, as a precautionary measure should not be allowed to ingest carbohydrates freely.

In an editorial by Brown[4] he discusses Allen's view that all diabetes is pancreatic in origin. It is now established that pituitary hypersecretion lowers the sugar tolerance and may produce glycosuria. Thyroid extract can induce glycosuria. It is well known that in Graves' disease one occasionally finds the appearance of sugar in the urine due to the lowered tolerance for sugar. So he concludes that under action of the pancreas or over-action of the suprarenals, thyroid or pituitary gland can produce a glycosuria.

Lack of knowledge of the exact structural change or changes in the pancreas which is accountable for diabetes is shown by Labbe[5] who examined the pancreas in 19 diabetic and 37 non-diabetic cadavers. No connection between the lesions in the pancreas and the intensity of the diabetes was apparent. Sometimes the pancreas seemed sound in graver cases. As a general rule many Islands of Langerhans were pathological, and transitional states from the Islands of Langerhans to Acini were frequent—the reverse was rare. In 30 of 37 non-diabetic cadavers in which the pancreas was examined it was found that the pathology was the same as in many of the diabetics and the lesions were of the same type, but in none was there such extreme sclerosis as was found in most of the diabetic cases. So it is, that neither histology nor pathological anatomy reveals the secrets of the diabetic process.

I think it is a generally accepted fact that patients with diabetes are more susceptible to infections; also that diabetic patients withstand infection less well than patients without diabetes.

We also have the surgical conditions directly due to diabetes; most common of which is diabetic gangrene, usually most often involving the lower extremities. This begins in the toes, gradually extending to the foot and progressing up the leg, so that surgical interference becomes imperative. Although these cases may present a sloughing, discharging foot the infection is of a lesser degree and is not to be compared to an acute infection, which is an acquired condition. However, there is a certain amount of absorption and the patient is in a truly septic state. Next, we may have surgical conditions, existing in a diabetic patient such as the presence of uterine fibroids, hernia, fistulae, postpartum lacerations, and new growths, benign or malignant. Let us consider for a moment the treatment of the diabetic condition itself regardless of the surgical condition.

That the Allen method of treating diabetes has come to stay is evidenced by increasing experience. There is little need here of enumerating the so-called Allen's treatment for diabetes.

Recently Newburg and Marsh have reported a series of cases in which they have been treating diabetes by an increase of fats—which of course is in opposition to the Allen treatment of diabetes. This treatment consists essentially in no starvation periods but allows 900 calories per day of 70 gms. fat; 20 gms. protein and 15 gms. carbohydrates continued until the patient is sugar free.

The question may be asked whether an operation should be carried out at once to remove the lesion which exerts an unfavorable influence on the diabetes or should an attempt be made to render the urine sugar free first or at least reduce the glycosuria so as to cause an improvement in the lesion and thus render the condition more favorable for operation.

Much may be said in defense of either step. Numerous instances have occurred in which surgical affections in diabetics have been healed spontaneously after rendering the urine sugar free; while it often happens that after successful operation the diabetes has taken a mild course and has shown improvement with disappearance of glycosuria.

The difficulty of deciding these problems is increased by the fact that a surgical operation exposes the diabetic patient to a greater danger connected chiefly with the anesthesia and operative shock.

Funk[6] believes that, apart from urgent cases such as strangulated hernia or perforative peritonitis in which operations are absolutely imperative, there is a question whether a given operation is justifiable and should be performed. It has been pointed out[7] that the difficulties are all the greater as diabetes and the surgical affection have a reciprocal baneful influence and a vicious cycle is created.

Reisman[8] says that the exaggerated fear of clinicians and surgeons of operating on diabetic patients is rapidly giving place to a more aggressive attitude, nevertheless, he is of the opinion that all operations which can be avoided in diabetic patients should be avoided, particularly those requiring a general anesthetic. Narcosis for diagnostic purposes is certainly unjustifiable and in all operations not of an emergency character an attempt should be made to first render the patient sugar free.

Some authorities[9] are opposed to the Allen method of treatment before operation while others[10] advocate it. Reisman does not feel that it is absolutely necessary to banish the last trace of sugar before undertaking an operation that is important for life and comfort. He says "it is well to administer alkali before an operation whether diacetic acid is present or not in the urine. If there is an acidosis present the dangers of operation are enhanced and unless an emergency it should be postponed and an attempt made to abolish ketonuria. In addition to pushing alkalis before and after operation, a 1000 c.c. of 5 to 10% sodium bicarbonate solu-

tion should be given intravenously while the patient is under the anesthetic during operation. This principle is in direct opposition to Kahn's[11] belief, who says the use of alkalis is contraindicated. Especial attention should be given to minimizing tissue trauma on account of liability to septic infection. For prolonged operations the anesthetic of choice he feels should be local anesthesia, using as little as possible to prevent tension sloughing. Nitrous oxide comes next in choice.

Labbe[12] declares it is better to refrain from operation on diabetics particularly where there is an acidosis, yet better to operate than let the patient die from septicemia. Operation should be preceded by sodium bicarbonate to render the urine alkaline, also measures to reduce the hyperglycemia and acidosis. He refrains from using fast days just before operation. This seems to be greatly emphasized by many writers. In the use of sodium bicarbonate Labbe recommends 48 gms. just before operation. He prefers local anesthesia, next spinal anesthesia, and for a general anesthesia ethyl chloride.

Reginald Fitz,[14] in a five year period at the Massachusetts General Hospital in a series of 380 cases of diabetes which came to his attention, noted that over 14% had surgical conditions which necessitated the surgeon's judgment as urgently as those of the medical man. We may conclude, therefore, that diabetes is not a medical disease exclusively. A surgeon should know the life history of a diabetic that he may balance the risk of operation in any given case and, if operation is necessary, he must be very familiar with the effects of various anesthetics and operations in order that the patient may be exposed to as little danger as possible. In this series of diabetic patients collected by Fitz, 9 of the 54 were obviously unsuited for any surgical procedure. Forty-five cases of the 54 came to operation, 13 deaths, or a mortality of 30% resulted. This fact alone shows that diabetics do not stand operation well.

Of these cases (45) 2 groups were formed. In the first group 20 cases were suffering from acute infection or gangrene before operation. In the second group of 25 cases each case was non-infected. Ten, or 50%, of the infected cases died, while 3, or 12% of the non-infected cases, died. From these figures it becomes immediately apparent that any acute infectious condition in a diabetic requiring surgical interference must be looked upon with the greatest of gravity, while any non-infectious condition requiring operation is more dangerous than in a normal individual not suffering from diabetes but may be carried safely through.

The majority of the above infected cases were surgical emergencies and so were unable to receive a thorough course of preoperative diabetic treatment. Four of the infected cases were prepared for operation by prolonged course of medical treatment; 2 of the 4 died, both being under 30 years, pointing to the fact that diabetes in young individuals is apt to be of a severer nature than diabetes occurring in older people.

Fourteen infected cases were operated soon after entering the hospital and suffered a mortality of 33%. Of the 25 known infected cases in which there was ample time for preoperative preparation all were given prolonged medical treatment and then turned over to the surgeon. Of these 25, 9 died. We may ask, therefore, how important preparation is for operation in septic cases. It certainly is an open question as judged by these figures.

Fitz feels that prolonged undernourishment necessary to get a patient's urine sugar free and to get his blood sugar within normal limits may so lower the resistance of the patient to infections as to be unjustifiable. The best rule would seem to be to postpone operation as long as seems safe as judged by the clinical condition of the patient, but not to wait until septicemia has developed or until the powers of recuperation and resistance are lost.

In an article by Doctor George W. Gardner of Providence, R. I.,[15] he offers the following statistics from a study of the diabetic cases, recorded at the Rhode Island Hospital for a period of the past five years. Of this series 8% showed definite improvement of the surgical condition while 12% showed local cure of the surgical condition but with a mortality of 80%.

In a series of 25 cases of gangrene of the toes or foot, 11 were not operated; of this number 6 died, 2 were discharged against advice with death imminent, and 3 improved.

Of 4 cases of toe amputation 3 were discharged against advice, presumably to die; one case healed. Of 2 amputations under gas-oxygen both died.

In a series of 4 lower leg amputations, 3 died; one of these cases was operated under ether while 2 were operated under gas-oxygen; one case healed.

In a series of four thigh amputations under gas-oxygen 3 died, one discharged against advice, presumably to die.

The cases varied greatly in many ways; some had been under diabetic treatment, some were of short duration, some of long standing with a great amount of sepsis. Various types of anesthetics were also administered.

Nellis B. Foster of New York,[16] in an article on "Surgical Hazards in Diabetic Patients," says that he feels the severity of diabetes in any given case can be estimated only by blood analysis; that infections tend to increase severity of the disturbance of carbohydrate metabolism, and in that way bring about a variable degree of acidosis; that the low resistance of the tissues to infections prolongs and intensifies carbohydrate disturbance and hence acidosis.

The recognition of these facts would make it possible to determine at least when operation

cannot be borne by a diabetic subject. The chief danger is always acidosis and coma. So a determination of these factors is essential. Estimates of plasma CO_2 combining power of the blood give a very definite idea of the degree of acidosis. Normal blood plasma shows a combining power for CO_2 above 55%. The severest degree of acidosis is evidenced by a combining power of 20% less. No diabetic patient who has come to his knowledge has successfully withstood any operative procedure whose blood showed a combining power of less than 30%.

He thinks that operative procedure is contraindicated with the CO_2 of the blood plasma less than 35%; 40% being the lowest figures that permits of a reasonable margin of safety for surgical procedure. Then, too, the degree of hyperglycemia cannot be ignored. One sees many patients suffering from diabetes with no acidosis but with the blood sugar over .35% who succumb to operation because of acidosis that develops post-operatively. When the blood sugar is a higher figure than .35% at time of operation a fatality is probable. We may say then that patients showing blood sugar over .35% or a plasma CO_2 combining power of less than 40%, cannot be expected to survive any operative procedure. The only safety with cases of this type is to change the metabolic state before surgical treatment is undertaken. If there is not time to do this the case is hopeless.

Ether anesthesia is certainly contraindicated in all diabetic cases because it has an immediate and definite effect upon the body fats and the liver and hence intensifies the disordered process.

I would like to report the following cases:—

Case 1.— G. C., female, age 57, family history negative for diabetes. Previous history: Diabetes for several years. Recently the great toe of the right foot had become gangrenous, which extended up the foot. On examination the patient was found to be in rather poor condition, listless and stuporous but could be aroused easily. The large toe of the right foot was completely gangrenous as well as the dorsum and sole of that foot. Her left leg was swollen to the knee. The Allen treatment was instituted. Five days later the patient's condition was not improved but rather for the past 2 days had been growing distinctly worse. Immediate operation was decided upon and high thigh amputation was done (June 6, 1916). Gas-oxygen was administered. The patient was greatly shocked following the operation but soon rallied somewhat. She grew worse again after 2 hours and died after 10 hours.

Case 2.—C. A., male, aged 55, gave a history of diabetes for several years; when first seen he had a gangrene of the left foot, extending half way up the dorsum. He showed considerable sugar in his urine. Patient had no preliminary treatment for his diabetes; was immediately operated on (October 30, 1911); a middle and upper third leg amputation was done; gas-oxygen. Time of the operation 25 minutes. Patient was conscious as soon as anesthesia was stopped. Made a splendid recovery; on 10th day stitches removed. Wound clean. Still showed some sugar in urine. Reports later showed patient in good condition.

Case 3.—W. W., male, aged 53, gave history of having had diabetes for years. At the time of first examination patient had diabetic gangrene of the whole right foot. He had been under diabetic treatment for some time and was sugar free when first seen. Consequently an immediate operation was done, February 20, 1916, under gas-oxygen; an amputation at the junction of the middle and upper third of the right leg. On the 10th day stitches were removed; wound in excellent condition; skin flaps healed well. Later reports concerning the health of patient were favorable.

Case 4.—G. D., male, aged 64. Previous history: Patient had diabetes for 9-10 years. Family history negative for diabetes. Present illness: For a week before first seen, gangrene of the left small toe was present which gradually included the fourth toe and dorsum of the foot. Physical examination showed the left foot swollen and the dorsum red and edematous; gangrene of last toe, which was discharging some pus. Patient was put on restricted diet since the urine showed considerable sugar. Two days later when operated, patient had a very heavy trace of sugar. A high thigh amputation was done under gas-oxygen (August 13, 1918). On the 10th day stitches were removed. His flaps showed some lack of vitality, urine at this time showed .35% sugar. From this time on patient showed variable amounts of sugar and after a month the flaps had gradually healed and the patient was discharged in good condition. Reports concerning this patient later were favorable.

Case 5.—F. P., female, age 50. Previous history; negative for diabetes. Family history irrelevant. At the time of first seeing her she gave a history relative to uterine fibroids. Examination proved this to be true. At that time her blood pressure was 170/110. Urine examination showed a trace of albumin; 1.5% sugar, no casts. It was thought best to delay operating that she might clear up of sugar. To this end she was put on restricted diet. A month later she was sugar free and a hysterectomy was done under gas-ether (December 9, 1920). Two days after operation her urine showed 1% sugar. She made an uneventful recovery and was discharged after 21 days. At the time of discharge she was sugar free. One month later she had about 1% sugar in her urine. On March 24, three months after operation, her blood sugar was .4%. Her urinanalysis was not done owing to the fact that the patient neglected to

send a specimen. She admitted when last seen on March 24 that she was eating anything and everything and feeling well. She had no diabetic symptoms at that time.

Case 6.—M. B., male, age 59, admitted to Memorial Hospital on the 28th day of February 1921. T. P. R. normal. At the time of entering the hospital patient complained of trouble with both legs—off and on for 8 years. Family history irrelevant. Previous history: About 1½ years previous to present admission patient was admitted to the Memorial Hospital with a diabetic gangrene of the left leg. For 2 weeks before, he had trouble with this left foot and on consulting a doctor he was told he had diabetes although he had no symptoms before this. He was operated on at that time, although he showed a very faint trace of sugar. Following his operation his flaps did not heal so he was put on a restricted diet and after 3 weeks his urine was sugar free. A second amputation was done at the upper third of the thigh and a good result was obtained. From this time until discharged the patient was sugar free. Physical examination showed a well developed, poorly nourished male. Blood pressure 170/80. Heart and lungs negative. Abdomen negative. Pulse equal and regular, arteries very much selerosed; extremities: Left leg amputated at junction of middle and upper third. Stump well healed. Right foot and lower leg gangrenous. Urine shows slight trace of albumen. Sugar 2.5%, occasional hyalin cast. Wassermann negative. On the 8th day of March 250 c.c. of sodium citrate solution given intraveneously; 2 days following 150 c.c. of sodium citrate solution given intravenously. His urine since he has been in the hospital has always shown a trace of albumin, sugar has varied between 2.5% to ½%. Also slight traces of diacetic acid. March 21 blood sugar was .4%. On April 5 he was put on Allen treatment. Two days later he was sugar free but there was a slight trace of diacetic acid blood sugar was .7%. On April 9 he was sugar free, blood sugar was .9%. There was a positive acetone test in his urine. Mentally he was clear. This case was not operated on account of persistent high blood sugar. Patient was discharged unimproved.

Case 7.—E. M. D., female, white and married, age 52. Patient entered Memorial Hospital on the 14th day of March, 1921. T. P. and R. normal. Family history negative. Previous history: Negative for diabetes. Present illness: Admitted to hospital for operation for lacerated perineum and cervix. Urinalysis following admission showed 5% sugar. No diacetic acid. From the time of admission up to April 7 (24 days) the urine had varied between 5% and 1%; never sugar free. Six days after admission to the hospital her blood sugar was 9%. Eight days after admission patient was put on Allen treatment; 24 days later her urine was sugar free but her blood sugar was .8%. This case also not operated on account of persistent high blood sugar.

Case 8.—H. M., male, age 55. C. C. gangrene of the right small toe and foot, duration six weeks, whole foot painful. Previous history: Seven or eight years ago injured right leg and foot and large toe. Large toe amputated and did not heal readily; was then found that patient had diabetes. After six or seven weeks his wound healed. Patient was well up to six weeks ago, at which time the small toe began to get gangrenous. Physical examination shows the right foot minus the large toe. Small toe is entirely gangrenous and some redness on the dorsum of the foot about small toe. Circulation in foot seems good. Urinalysis shows large amount of sugar. Operation June 18, 1921. Blood sugar at this time .24%. Urine showed a positive test for sugar. Amputation of foot June, 1921. Three days later patient died from pulmonary embolism. Convalescence had been satisfactory up to this time. No evidence of acidosis or coma.

Case 9.—P. S., male, age 70. Family history: Negative. Previous history: Has had diabetes for seven years. Present illness: Four weeks ago began to have trouble with the right small toe. Examination shows small toe of right foot gangrenous with a discharging area on dorsum just above the metatarsophalangeal joint. Some redness of the dorsum of the foot beyond the other toes. Tender on plantar surface along the metatarsophalangeal joints. Seven days later blood sugar was .29%. Put on Allen treatment (ten days after). Four days after patient was placed on Allen treatment there was no sugar in the urine. Seventeen days after the patient was first seen, the blood sugar was .13%. On March 28, 1922, under gas-oxygen, leg amputation was done at the middle and upper third. Following the operation patient showed only slight amount of sugar in urine. The patient was discharged twelve days after operation; wound being healed entirely.

From the above data, which comprise the statistics and opinion of recognized clinicians, I think we may draw the following conclusions:

First:—No diabetic is as good a surgical risk as a normal individual.

Second:—No diabetic with an acute infection is as good a surgical risk as one without signs of infection.

Third:—Acute infections which jeopardize the life of the patient should be dealt with immediately, although a greater risk is incurred than in a non-diabetic patient.

Fourth:—A course of preoperative treatment whenever possible is essential to minimize the dangers of operation in a diabetic and should be carried out.

Fifth:—That it is essential that we should estimate the percentage of blood sugar; glycosuria, and plasma CO_2 combining power before operating upon a diabetic except in those cases where the presence of acute infection, peritonitis, strangulated hernia, intestinal obstruction, or some such condition makes immediate operation imperative.

Sixth:—In any diabetic patient showing a persistent blood sugar over .35% or a plasma CO_2 combining power of less than 40% operation is hopeless, and best not be resorted to.

Seventh:—The risk of any operation for a properly prepared non-infected diabetic case is slight.

Eighth:—Gas-oxygen is the only safe general anesthetic. Local anesthesia taking second place, with spinal anesthesia to be recommended when the previous two cannot be used.

Ninth:—Ether or chloroform is absolutely contraindicated in diabetics.

In summing up it would seem from the general review of statistics as well as our own cases, that many diabetics in the past have been operated upon without due regard to blood sugar examinations; plasma CO_2 combining power or any definite preoperative course of treatment. That the statistics generally are not worse is undoubtedly due to the fact that without our knowledge many of these cases were safe for operation. That today we have a definite means of laboratory diagnosis, which tells us which cases are comparatively safe for operation, and on the other hand indicates those cases that should not be operated, or in which with existing conditions operation is absolutely contra-indicated.

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DISCUSSION OF DR. JONES' PAPER.

DR. ROBERT B. OSGOOD, Boston: I would like to ask Dr. Jones if he has had any experience with the work of Banting, of Toronto, in connection with the administration of the internal secretion of the pancreas?

DR. STEPHEN A. MAHONEY, Holyoke: I should like to speak of a case that came under my care ten years ago that died two years ago in diabetic coma. She was suffering from a prolapse of the uterus which required a long operation. At that time blood chemistry was not in the state it is today, and there was no attempt made to determine the blood chemistry. There was 5 per cent. of sugar in the urine. I tried to avoid operation, but the prolapse of the uterus was so extensive that it incapacitated her from her duties. I did the operation seven years ago. The operation consisted of a vaginal hysterectomy, freeing the bladder and placing the stump of the broad ligament under the bladder; a perineorrhaphy was done at the same time, together with hemorrhoids. The woman made a complete recovery, enjoyed life perfectly for six years. During the last six years of her life she was under the care of Dr. Joslin of Boston, and she finally died two years ago in diabetic coma. The anesthetic was ether. The time of the operation was close on to two hours, and yet she could not have had a more satisfactory recovery than she did with her severe case of diabetes.

DR. FRANK H. LAHEY, Boston: Those of us who work on diabetes get spoiled by Dr. Joslin's treatment and we send the patient over to Dr. Joslin and ask him when to go ahead. So we lose the personal details in the care of these cases. I don't know whether it is a good thing or not. The average surgeon does not have the time to go into the literature of the subject and is not able or qualified to treat them as intelligently as the medical man.

Dr. Joslin has impressed upon me one or two points which are of importance in the prophylaxis of diabetic gangrene, which when once started jeopardizes the patient's future. He has said to me that it would be an excellent teaching to make diabetics wear the proper kind of shoe, a shoe which does not produce a blister so that gangrene, which usually starts at the point of the toe, will be prevented. And that ingrowing toe-nails should be prevented so that the infection does not predispose to a diabetic gangrene, which frequently ends the diabetic's career. These may seem to be points of minor importance. But since diabetic gangrene is accepted as a serious condition, as is so often the case elsewhere in surgery, factors which prevent the occurrence of this condition are of doubled importance.

DR. ARTHUR T. JONES, Providence: I think that we have all in the past been called upon to give a decision in certain cases in rather a serious condition as to the wisdom of operation, as to whether the case should be operated upon or whether it is going to die any way. Heretofore we have had few indications to go by with the exception of the sugar content of the urine. That we feel today isn't sufficient, and now with our laboratory findings we have definite indications, and we can say in certain cases "Let that case alone." If the blood sugar is below .35, and if we get our patient's urine sugar free, we can operate on that patient.

Dr. Mahoney's case illustrates the experience we have been going through. We have operated on cases in which we didn't know what the blood sugar content was or the CO_2 combining power. In his case that woman undoubtedly had a blood sugar content of less than .35 per cent. If it had been higher the result would have been quite different. Today we should know the blood sugar content and the CO_2 combining power, as well as the urine findings.

POSTOPERATIVE INTRA-ABDOMINAL ADHESIONS.

BY RALPH H. SEELYE, M.D., SPRINGFIELD, MASS.

In the progressive advance of surgery towards its visionary goal of perfection there are unfortunately many casualties which impede the attainment of what is to be desired. The possibilities of untoward results which immediately or soon follow surgical procedures are as constantly in the mind of the surgeon as is the contingency of an accident in his daily course through vehicular traffic. The more remote results of surgery lacking perfection are perhaps not always given sufficient consideration. The two important examples of such sequelae not dependent upon error of diagnosis or treatment are postoperative herniae and postoperative adhesions. Except in drainage cases, and very largely even in these, postoperative hernia, by improved technic, presents slight cause for anxiety to the careful surgeon. Upon investigating the subject of postoperative intra-abdominal adhesions, however, it has become apparent that a consideration of this condition and an analysis of available cases may not be lacking in interest.

The records of the Springfield Hospital show what was to me a rather surprisingly large number of cases admitted with the diagnosis of postoperative adhesions. From 1910 to 1921 inclusive there have been found 82 such cases. A very small percentage, it is true, of the total number of cases, but, nevertheless, a rather imposing array, when grouped together, of end-results of the sort which do not contribute to the self esteem of the surgeon.

It requires but a mild inflammatory condition or a very moderate amount of traumatism to so affect the peritoneum that its smooth glistening surface is lost and it readily adheres to whatever it may be in contact with. Adhesions may be tremendously extensive in certain varieties of tubercular peritonitis and in pelvic infections, so much so as to leave very little unadherent peritoneum in the lower abdomen. The trauma associated with any abdominal operation is practically always followed by something in the way of adhesions, as is noticed when the abdomen is opened a second time. In by far the most cases the presence of adhesions is something the patient is never conscious of, but occasionally, as will be shown, they not only give rise to considerable discomfort, but may bring on consequences of the utmost seriousness.

It must be the experience of every surgeon to hear from time to time complaints from his old patients of indefinite abdominal pains. Many of them are in neurotic women and are not to be taken too seriously. Many others gradually disappear. There are, however, a considerable number that require surgical attention. We find, as has been stated, 82 such cases admitted to the Springfield Hospital during the past 12 years. Of these, 21 did not come to operation. Some improved under hospital care, some either satisfied or dissatisfied with the diagnosis left, cherishing the hope that they might escape the experience of the operating table. One of these cases was on my service in 1912, having had appendectomy two years before and one year later an operation for postoperative adhesions. She was discharged with the diagnosis of neurasthenia, but turned up three years later with a diagnosis of intestinal obstruction. The records report "no definite obstruction," but there were bands of adhesions from the upper portion of the sigmoid to the bladder. This illustrates the injustice we may do neurasthenic women in minimizing their symptoms. On the other hand, a young woman, highly strung, but not to be classed as a neurasthenic, seven years after a simple appendectomy had attacks of pain at intervals extending over a period of about a year. With the conviction that she was suffering from adhesions I sent her to a roentgenologist, whose assurance that she was absolutely normal was followed by a complete disappearance of the symptoms.

As might be expected, we find that the largest number of cases in this series follows appendectomy not only because this operation is more frequently done but also because appendicitis is attended by inflammatory conditions tending to cause adhesions. To one desirous of obtaining detailed information the history sheets furnish a record that can scarcely be commended for anything but their brevity. One who is curious as to the various types and degrees of severity must rest content with the knowledge that of the 35 cases, plus nine in which appendectomy was done coincident with some other operation, 11 only can be catalogued as to the type of appendicitis with which they were affected; two of them were chronic catarrhal, six were acute catarrhal and three were gangrenous or perforated. It is unfortunate that no conclusion can be drawn as to the likelihood of troublesome adhesions from the nature of the case. The impressions gained from experience, not to be compared in accuracy with reliable statistics, it must be admitted, lead me to the conclusion that symptoms from postoperative adhesions are rather more frequently found after the milder forms of appendicitis than in those of greater severity. Perhaps this may be explained by the fact that in the latter the intestines are matted together to a considerable extent so that there is not present the tendency for them to be pulled upon or constricted by individual bands of adhesions.

This suggestion is confirmed in the group of cases following operations upon the ovaries and Fallopian tubes. Of 13 in this list only one had had pelvic inflammation which was at all exten-

sive—acute double salpingitis with acute peritonitis. The by no means uncommon cases of purulent salpingitis with the whole pelvis a mass of dense adhesions do not apparently incur the danger from adhesive sequelae that are to be found after the less inflammatory pelvic cases.

Adhesions following hysterectomy appear only in three instances. One of them comes in with a diagnosis of "chronic intestinal obstruction from adhesions." The hysterectomy was 18 years before and intestinal symptoms extended back only a few weeks. As no operation was done and as the record of her 22 days' stay in the hospital showed almost daily dejections, the diagnosis may be considered as doubtful and the influence of the previous hysterectomy may be questioned. The second had hysterectomy six years before and made no complaints until two weeks before. The diagnosis was postoperative adhesions, but the symptoms noted were of little significance. Two weeks in the hospital apparently effected a cure. The third case had intestinal obstruction after hysterectomy one year before, and after two days of pain and vomiting was operated upon with fatal result. I recall another case that three weeks after hysterectomy developed an acute intestinal obstruction. On the freeing of a knuckle of intestine which was kinked by an adhesion to the uterine stump she made a good recovery. This was evidently due to an error in technic resulting in failure properly to cover the uterine stump, leaving raw surface to which bowel might adhere. An explanation of the observation that so few hysterectomies are followed by troublesome adhesions is to be found in the fact that inflammatory action is not present and that with proper technic no raw surface is left.

After operations for ectopic pregnancy one might expect a relatively large number of postoperative adhesions on account of the amount of blood clot that must necessarily be overlooked in making the peritoneal toilet. There is a record, however, of only one case. This patient had constant but not severe pain for three months following operation. On opening the abdomen at this time several adhesions were found and freed. None appeared to be causing any disturbance. The relief, however, was permanent.

Adhesions are noted as causing trouble after four cases of intestinal anastomosis; one culminated eight days after operation and resulted fatally six days after the breaking up of the adhesions; one was relieved of pain and vomiting by the separation of adhesions; the third was sufficiently grave to suggest the diagnosis of obstruction, a condition not established on operation, and the fourth was one which developed acute obstruction two years after complete colectomy.

After hernia operations we find only one case. In this the element of adhesions was rather secondary as the essential feature was an obstruction of the bowel gradually coming on for a year after an operation for strangulated umbilical hernia, showing a cicatricial stenosis with almost complete obstruction.

One operation for diverticulitis was followed by postoperative adhesions.

Gall-bladder infections are notably associated with adhesions. Ten cases are found which were sufficiently troublesome to require hospital treatment. Three of these had had cholecystectomy, of which one was not considered to require operation and two were found to have rather extensive adhesions, with pain and nausea and vomiting. Of the seven which had undergone cholecystotomy four had simple adhesions and three came to cholecystectomy. In those cases in which cholecystectomy was not originally done the postoperative symptoms may perhaps quite as consistently be accounted for by the presence of an old pathological gall-bladder as by adhesions. Stomach surgery has been followed by only four instances of postoperative adhesions according to the records. Two of them had symptoms of pain and vomiting but were not operated. The remaining two were found to have adhesions but were also found to have gall-bladders which presented sufficient pathology to call for their removal. On the whole, surgery of the upper abdomen does not apparently carry in its wake the stigma of later adhesive casualties that are found in the lower portion of that most interesting region. To balance the number we must reluctantly admit 10 cases in which the already much maligned records give no information as to the surgical procedure which preceded the state of varying degrees of intestinal cohesion which urged them to the hospital for relief.

Summarizing the cases as to what may be considered their etiological significance we find that postoperative adhesions have resulted from various operations as follows.

Appendectomy 35, not counting 9 cases in which this operation was done coincident with some others.
Oophrectomy and salpingectomy of both, 13.
Hysterectomy, 3.
For ectopic pregnancy, 1.
Intestinal anastomosis, 4.
Herniotomy, 1.
Diverticulectomy, 1.
Cholecystotomy or cholecystectomy, 10.
Gastroenterostomy, 4.
Not recorded, 10.

If we may indulge in animadversions directed towards another viewpoint we may observe that these cases, analyzed with reference to their symptomatology and pathology, present a not uninteresting subject for consideration. As one would naturally expect, pain is without exception the predominant feature. Nausea and vom-

iting are not infrequent. Pain is the only symptom noted in 55 cases. Nausea and vomiting are mentioned in 12 cases. Sixty-seven cases of postoperative adhesions, most of which were not in serious condition at the time. Remembering that 21 were not operated upon, we have 46 cases of relatively simple adhesions without much evidence of serious pathology. We do find, however, one group of cases of the utmost seriousness presenting a condition than which there is little in surgical practice to compare with it in gravity. Thirteen of these patients had, as the result of adhesions following operation, intestinal obstruction. All were operated upon and the mortality was in conformity with what is observed in this sort of case. Seven lived and six died. Two of the cases are recorded as partial obstruction, one as chronic obstruction, and one as mechanical ileus. In six the adhesions were separated, with the unfortunate result of only one survivor. The remaining three were resected with uniformly good results.

In addition to the cases of obstruction appearing in these records there must be a considerable number which should have been classified with them, but which on account of failure to associate them with adhesions were enumerated under the heading of intestinal obstruction.

I recall a case, not in this series, of a young man operated upon six years previously for appendicitis. There was evidence of acute obstruction. On opening the abdomen a narrow band was seen completely constricting the ilium near the caecum. Division of this band was immediately followed by the rapid filling of the collapsed bowel and the resumption of peristalsis, a sight which more than compensates the surgeon for his efforts and which tends to a slight degree to counterbalance some of his unsatisfactory results.

There remain in this group, viewed as to their symptomatology and pathology, two cases. One is that of a man who had appendectomy seven years before. Associated with his postoperative adhesion he was found to have carcinoma of the caecum, a condition which cannot probably be dependent upon either his previous operation or the resultant adhesions.

The other case is perhaps sufficiently interesting to warrant a more detailed description. It is that of a young woman who had appendectomy done in Boston, where she was attending school, in December, 1914. She soon came home and, quoting from my letter to her surgeon, we find that: "For a period of two or three weeks she had severe pain, which began on the right side and gradually localized in the left flank. This was associated with exquisite tenderness so that palpation was extremely difficult. A mass, however, finally became apparent, and it was decided to operate. On January 4 we made an incision just outside of the descending colon. From the temperature, feeling of the mass, and tenderness, we feared we should find a sponge. Am glad to say that a most careful exploration satisfied us that that was not the case. We found, however, the descending meso-colon very much thickened, and in one portion of it a small abscess, containing perhaps half a dram of pus. The area of thickening was perhaps three or four inches long and one inch to one and one-half inches thick. Nothing else abnormal was found. For a week after the operation there was a free discharge of pus, which has practically ceased now. There has been tremendous tympanites, causing great distress. This has been associated with nausea, and it has been very difficult to keep the bowels free. I am glad to say that during the past week all these conditions have improved, so that now, although Miss W. is pretty weak, she seems to be on the road to recovery."

Six years later, in January, 1921, it is found that she has been troubled with very obstinate constipation, with flatulence and considerable abdominal pain and tenderness. The x-ray showed the hepatic flexure of the colon adherent to the lower portion of the descending colon, so that the colon instead of going up, over and down, went over, up and down. The adhesions were freed and the bowel restored to its normal position, where it was held by a few stitches from the hepatic flexure to the abdominal wall. The result has been very gratifying as all symptoms have disappeared except the constipation, and this is much improved.

It has already been set forth that after even the simplest abdominal operation there is great likelihood of resultant adhesions. But when it comes to matching up the symptoms with the probable menace of these adhesions and advising for or against operative interference, the problem is not a simple one. The cases of obstruction are only too obvious and automatically proceed without argument to the operating room, where they have about a 50-50 chance of later on taking up the duties and pleasures of life. A large proportion of the other cases, which represent 84 per cent. of the total in this series, requires very careful consideration. It is probably a safe statement to say that all the cases of obstruction might have been forestalled if they had been intelligently observed before they were stricken by this sword of Damocles, just as one may say that a gangrenous appendix always gives anticipatory warning, and so for that reason should not be allowed to reach its development.

It is a very nice question to decide as to how much pain (and that is practically the only symptom we have to base our diagnosis on) a patient is to have to entitle him to an exploration. In many of the mild cases a careful regulation of the bowels is sufficient to restore a comfortable existence. If this, however, is not effective, and if the neurotic element does not over-

shadow the picture, an exploration may be regarded as the safest and wisest procedure. The x-ray will frequently be helpful in arriving at this conclusion. It should not be disregarded while one is engaged in the separation of adhesions, that many of them are harmless, and that two raw intestinal surfaces caused by separation from each other will each unite to another portion of the bowel, making two adhesions where before there was but one. Bands should be divided. Kinks should be eliminated. All raw surfaces should if possible be covered by omentum or other available tissue, and harmless adhesions should be allowed to remain.

In the matter of prophylaxis the operator has it in his power to accomplish much in the prevention of postoperative adhesions. Those due to inflammatory conditions he cannot combat, but much harm can be prevented by the avoidance of rough handling, and the too zealous use of sponges. It has become a very important item in surgical technique, and one that should be insisted upon, that no raw surface be left uncovered. This can practically always be accomplished, and will do much to eliminate future trouble.

The paucity of the records has curtailed much that might be of interest in the study of these cases. Nevertheless it may be concluded that postoperative adhesions are a by no means uncommon cause of discomfort, invalidism, and death; that proper recognition and treatment of this condition will prevent suffering, and save life, and that improved technique will do much to prevent its occurrence.

DISCUSSION OF DR. SEELYE'S PAPER.

DR. HENRY C. TINKHAM, Burlington: I would like to know what the experience of the men here has been in introducing melted vaseline or any of the oils into the peritoneal cavity to prevent adhesions.

DR. HERBERT L. SMITH, Nashua: I recall a case which at the time seemed to me very extraordinary. It was thought to be a case of acute appendicitis, although there were some unusual findings and there was some difference of opinion among the consultants. It proved to be a definite case of appendicitis, but in addition it was found that there were almost universal and very firm adhesions, all the small intestines being glued together in such a way that it was impossible to separate them without great danger of tearing through the walls. It was quite evident that these adhesions had nothing to do with the recent infection of the appendix, but was a tubercular process. The patient, a woman of about thirty-five, gradually improved, under out-of-door conditions, and was finally able to take up her household duties.

About five years later she developed some sort of pelvic trouble which called for exploration. To our amazement, when the abdomen was opened there before us lay all the intestines in a perfectly normal condition, covered with shining peritoneum. Not an adhesion could be seen! If I had not seen this with my own eyes and attempted myself to separate the adhesions I would not have believed it possible. I believe the patient has been well ever since.

DR. HENRY C. TINKHAM, Burlington: I had a case identically like that, a case of acute abscessed appendicitis and later we found that the adhesions were all gone and the appendix was removed without difficulty.

DR. FRANK H. LAHEY, Boston: One of the men at the —— hospital introduced paraffine oil some years ago in an attempt to prove whether or not it had any value. It is now proved that it has no value in the prevention of adhesions. Vaseline is of the same character as paraffine. In the paraffinoma cases there are tumors which when split open contain paraffine oil, and it will in our opinion not only not prevent adhesions but will undoubtedly produce them by the production of walled off masses of vaseline.

DR. DANIEL F. JONES, Boston: This seems to me to be a very important paper because so many abdominal symptoms are laid at the door of "adhesions." It seems to be a term very similar to "neuritis." There are three groups into which patients suffering from "adhesions" fall. (1) Those with complete or partial obstruction. (2) Those who are suffering from some other lesion, such as the case reported by Dr. Brewster of intermittent hydronephrosis, gall-bladder disease, or duodenal ulcer. (3) A very few who have some slight abdominal discomfort, perhaps due to adhesions.

A very striking case was that of a young man of twenty-eight who had been operated upon three times; once for a chronic appendicitis, and twice for "adhesions," following the first operation. He came to me for the fourth, because of adhesions which the doctor and the x-ray diagnosed. Proper exercise for a bad posture and stiff back, directed by an orthopedic surgeon, relieved him of his pain, which had kept him from work for eight years. He is now well and has been working for several years.

How many cases of pain due to a duodenal ulcer were relieved by separation of "adhesions" about the duodenum as used to be done frequently? It is a very strange coincidence that patients who have been operated upon for acute appendicitis and have had drainage, and in fact any inflammatory process in the abdomen in which we know there must be adhesions, rarely return to us because of "adhesions," while those who have had an ovary or a chronic appendix removed frequently return because of "adhesions." It is important for us not to get the idea of "adhesions" too firmly fixed in our minds, for we will be likely to overlook the real cause of the symptoms.

DR. ERNEST L. HUNT, Worcester: I don't want to let this opportunity go by without confessing to a case of a young woman who comes to me repeatedly for adhesions which produce obstruction and for which she has had 17 operations. It began as an acute suppurative appendicitis. It was operated upon the first time in a neighboring city, and she came to me after about the tenth operation. At one operation a large portion of her cecum and a large portion of the ascending colon were resected—I

don't know just what for but I presume as an incident of the obstructive attacks. The young woman, who is a lovable person, will go for three to four months and then have obstruction of a very severe type, and she is now in a private ward recovering from one of those attacks. I have looked up all of these methods of putting in oil and one thing and another with a hope of preventing the adhesions, but nothing gives success. The intestines are entirely matted together. There is no normal peritoneum anywhere, and by sharp dissection we separate the coils and she has a few weeks of respite, and then they form again. I think there are quite a few of such cases on record.

DR. RALPH H. SEELYE, Springfield: I am glad that Dr. Lahey answered Dr. Tinkham's question about the use of vaseline. I have never used it myself. I don't know much about it but never had any confidence in it. I want to emphasize what seems to me to be the fact that these adhesions which cause trouble even to the point of obstruction, seem to come in the milder cases more than in the cases of very extensive abdominal inflammation. And it seems to me that is because in the extensive abdominal inflammation the intestines are so matted together that they become a more or less solid mass and are not affected by kinks and twists and bands. If we think of it, we will see that most of our cases, even the cases of obstruction are apt to be caused by a small band or kink and not by general inflammatory matting together of the bowels. I don't want to be considered as advising operation on all cases that complain or present symptoms of intestinal adhesions. I think we should be very careful.

DR. C. A. PORTER: Have you any answer to Dr. Hunt's question? What would you do in a case like his?

DR. R. H. SEELYE: I don't think I would do as much as he did.

DR. E. L. HUNT: If she was your daughter, would you let her die? She goes to the point of fecal vomiting, great pain, prostration—the usual manifestation of obstruction.

DR. SEELYE: No; I would do something there.

Original Articles.

A CLINICAL AND PATHOLOGIC STUDY OF TONSILS SUBJECTED TO X-RAY.*

BY CHARLES R. C. BORDEN, M.D., BOSTON.

THERE are many cases of diseased tonsils in which it would be desirable to combat the diseased condition without surgical procedure. It was hoped and claimed that the x-ray would cause a shrinking of the tonsil and disappearance of the pathological condition.

*Read before the Eastern Section of the American Laryngological, Rhinological and Otological Society, January 27, 1923.

Desiring to learn to what extent atrophy actually would occur after x-ray treatment of tonsils, I obtained the coöperation of Dr. Paul F. Butler, who agreed to radiate a series of tonsils which I would later resect. Dr. Frank B. Mallory consented to prepare the resected tonsils and study them microscopically. Dr. Frank L. Richardson generously offered his services for anesthesia.

In order to obtain all possible information first hand, Dr. Butler and I went to New York and called on Dr. Witherbee, who was at that time, and probably still is, the leading authority on the subject of roentgen-radiation of the tonsils.

Dr. Witherbee was exceedingly courteous. He explained his methods, showed us his apparatus and outlined his treatment at great length. He further explained how we might proceed with the experiments from where the Rockefeller Institute had left off. For all of which information we felt greatly indebted to him. On our return we made our plans to carry on the work as he suggested.

Our patients, with three exceptions, were nurses in private hospitals in Boston or its vicinity. The three exceptions came from my private practice.

Dr. Butler radiated a total of 16 cases. From all but two of these I resected the tonsils. Of the two not resected, one was a woman 65 years of age, who considered herself too old to be operated on. Her daughter was one of the resected cases, and since the two came to my office at the same time and each received the same number of radiations, I was able to use one as a control case against the other. The second unoperated case was a young nurse from one of the suburban contagious hospitals. This young woman exhibited such a sharp reaction after the first radiation that I deemed it unwise to allow her to proceed in the treatment because of her none too healthful environment. The cases were radiated, some once, some twice, some three and some four times. After each radiation the patients came to my office at frequent intervals for observation. That you may properly understand how Dr. Butler conducted his part of the work, I have asked him to present briefly his method of radiation. His statement is as follows:

"The technique employed is that laid down by Witherbee; this has been found the most satisfactory. A spark gap of seven inches, ten inches distance from tube target to skin, three mm. of aluminum for filtration of the softer rays, five m.a. of current and a total of four minutes' exposure over each side. The patient is laid face down with the head turned on one side and the head and the upper portion of trunk covered with a sheet of lead, into which a hole has been cut sufficiently large to expose the area required. Patients as young as six years of age

have been treated by this method without difficulty."

Lack of time will not permit me to report single cases in detail. From now on I will consider the cases as a group and briefly describe to you certain unusual clinical reactions which appeared after the tonsillar radiations.

Before radiation, the color of the throats varied from the pale pink of the average normal individual to the intense red which is associated in our minds with the hyperemia of acute inflammation. In two cases the entire throat was unusually pale, in two others it was intensely red. After radiation the immediate change in color was remarkable. It nearly always changed from the various shades of red or deep pink to pale gray or a very light pinkish gray. The most marked change occurred in the anterior pillars and mesial surfaces of the tonsils; but if the lateral bands and the posterior wall of the pharynx had been previously inflamed and red, a similar change occurred in them also. Some days later a number of the tonsils assumed a mottled grayish color, which apparently was peculiar to the action of x-ray radiation. I had never seen this peculiar mottling come from any other source. In a certain number of the cases the throat assumed a peculiar striped appearance due to single blood vessels of some size running more or less parallel to each other in addition to the gray mottled color.

The size of the tonsils before radiation was of no special importance. In only six cases could they have been called really enlarged. In none of them were the tonsils particularly small. Twenty-four hours after radiation it was not difficult to make one's self believe they were smaller. I can now read between the lines of my records which were written nearly a year ago and find there proof that my enthusiasm at that time influenced my judgment. Mature consideration and greater experience have taught me to be more impartial, and I can truthfully state that in but few cases did the size very materially decrease so far as the entire tonsil was concerned. It was true, however, that not infrequently one tonsil did seem to decrease more than the other, especially in the superior lobe. Undoubtedly there was some shrinkage on the free border and external surfaces which gave the appearance of a smaller tonsil, but in reality I am quite sure no real diminution in size occurred. The question of surface shrinkage will again be discussed in connection with changes between the anterior pillar and the tonsillar capsule.

In a majority of my series of cases there occurred a swelling of the base of the tonsil. This symptom was present in considerably more than 50 per cent. of them. You will doubtless be surprised to hear that in many of the cases at the time of operation the tonsils were found to be not smaller, but definitely larger. Furthermore, in looking back over my experience with these cases, I think I can truthfully say that the more they were radiated the more the deeper parts of them were enlarged. This was one of the reasons why I stopped the radiations after giving four. In the cases radiated three and four times, the bases of the tonsils mushroomed out so far behind the pillars that it bothered me somewhat to tighten the snare wire around them without injury to the pillars or uvula.

After radiation, sensation of the tonsils seemed to be decreased. The most timid of the patients then allowed me to probe and otherwise examine their tonsils without showing evidence of discomfort. Naturally, I did this as carefully and gently as possible, but I did not hesitate to make use of this remarkable opportunity to determine any unusual conditions should they be present.

Writers on x-ray and radium treatment for the removal of tonsils emphasize the fact that after radiation the crypt mouths are unusually open. In six of my cases this symptom was prominently present. To the best of my knowledge, this symptom occurs as the result of a limited amount of shrinking which takes place within the mesial surface of the tonsil and causes the crypt mouths to evert at their extreme ends only. I further believe that it has no surgical importance regarding free drainage from the crypts. This statement is based on the fact that free pus was found in a considerable number of tonsils having open crypt mouths. In the two most diseased tonsils of the series the mouths of the crypts were specially everted.

Perhaps the most striking feature which occurred in my series was the action of radiation upon the anterior and posterior pillars of the palate. In one case, 48 hours after x-ray, a distinct cleft appeared between the anterior pillar and the tonsil. From day to day for a while this cleft grew wider. Finally, it appeared as if the tonsil had split away from the anterior pillar leaving part of the tonsil attached to the pillar. This puzzled me quite a bit. I could not understand what had occurred, since I could see no reason for one part of the tonsil to separate from another. Finally it dawned upon me that part of the tonsil had not separated from itself, but that the plica triangularis and anterior pillar had separated from the body of the tonsil. Now realizing just what had occurred, I studied this phase of the situation with the keenest interest. It was with great satisfaction that I saw this separative action enlarge from day to day. Finally, in this and in other cases, the cleft became so wide and open that the entire anterior pillar could be lifted back to its fullest extent with the greatest ease, causing no discomfort to the patient. It was at this time that I was able to study the condition of the base of the tonsil and to note its swollen, watery appearance. The separation of the anterior pillar was not all that happened. Gradually a similar action began in certain cases wherein the posterior pillar separated from the posterior surface

of the tonsil, leaving a deep white-walled sulcus, the sides of which corresponded to the capsule of the tonsil in front and the posterior pillar behind. This occurred in the sixth case three days after radiation, but in another case it did not appear until 35 days after radiation. In the ninth case, which had been radiated but once, separation of the posterior pillar was not apparent until the time of operation, and even then only when the thin plica was incised over its posterior border. It was then apparent since the tonsil was large and the separative cleft deep and noticeably white. It occurred only on one side of the throat, the other tonsil being adherent to the posterior pillar. Furthermore, the cleft appeared on the side of the more diseased tonsil, which was filled with yellow pus. In two cases the separation about the tonsil was so extreme that I was able to pass a good-sized probe around the superior lobe. There were two cases in which no separation of the pillars occurred. In both, the anterior and posterior pillars were everywhere tightly adherent. One was x-rayed once, the other four times. In the eleventh case the anterior pillar covered the anterior surface of the tonsil and radiation had no effect on it at all. This case will later be described as the most troublesome of all at the time of operation. Curiously enough, however, in this case radiation immediately cured a troublesome cough of long standing.

Another remarkable phenomenon connected with the radiation of tonsils in my series was a certain unusual smoothness which took place on the mesial surfaces of certain of the tonsils. Such tonsils had an appearance not unlike the rounded ends of an uncooked sausage. Both the color and the texture resembled the sausage. This peculiarity was unilateral and was in marked contrast to the fellow tonsil on the opposite side. Such a tonsil appeared more retracted than the opposite one and in every way it seemed to be most innocent and inoffensive. Such, however, was far from being true. In practically every instance, this particularly innocent and meek-appearing tonsil was found, on operation, to be filled with pus or cheesy débris. One particularly smooth tonsil burst from the pressure of the grasping forceps. As previously stated, a number of the smooth-surfaced tonsils had unusually large crypt mouths.

In contradistinction to the smooth surfaced tonsil was the exact opposite condition in which the mesial surface of the tonsil appeared irregular or knobby. What had taken place in this event I am unable to explain. It apparently had no special significance, at least none that I have been able to note thus far.

In four cases a marked horizontal cleft appeared at the junction of the upper and the middle two-thirds of the body of the tonsil. This had a special significance in that a fold of the plica triangularis not infrequently turns in at this point and penetrates into the body of the tonsil for a greater or lesser distance. For this information I am indebted to Dr. Harry Barnes.

During the time of observation two cases developed coryza. Both were subject to more or less sore throat at such a time. Both claimed to have soreness in the throat, but in neither, so far as I could observe, did any redness develop in or about the tonsil. The coryza was not due to radiation, but to the natural causes of coryza.

After the second, third and fourth radiations, three cases showed more or less reaction in the tonsils or the glands in the neck. In neither case, however, did anything serious occur, and the reaction soon passed.

I am well aware that many of you will say I did not carry the work far enough, and that the number of radiations required to produce atrophy in the tonsils is eight or more. Witherbee has already made a similar public criticism of my work. In answer to such criticism I will state I have been unable to find anything in the literature on the subject which will definitely prove that eight radiations will produce any more lasting change in the tonsil than will one. Dr. Lahey, an authority on goiter, told me he had within a week removed a thyroid which had been x-rayed 18 times. When removed, this particular thyroid showed no apparent change as a result of the 18 radiations. Dr. Butler tells me there are cases on record of tubercular glands which have been radiated as many as 140 times. There are other reasons why I stopped the radiations. First, the patients became uneasy; knowing they were to be operated upon they were anxious to have the operation over. One of them said to me, "Please, to stop fooling and go ahead and do something worth while." Secondly, I did not care for the appearance of the throat of several of the cases which had been radiated more than twice. Thirdly, operating grew more difficult as the number of radiations increased, because of the swollen edematous bases of the tonsils. Fourthly, the patients, almost without exception, were not showing any systemic improvement as a result of the radiations. (Case 1, who had a semi-acute middle ear, was the one exception to this statement.)

When the various cases came to operation, I had, except in one or two instances, a delightful experience. With the superb anesthesia rendered by Dr. Richardson, I was able to observe and to explore to my heart's content. Much of the dissection had already been done by the x-rays, and hemorrhage was usually absent. The time of operation was materially shortened. To emphasize how easy the operating was in certain cases, I will state that Case 6 took but nine minutes, including the ether induction and removing patient from the operating room. Two cases bled considerably in spite of radiation. In Case 12 no bleeding occurred at all which required sponging until the base of the second tonsil was separated by the snare wire. Then a pulsating hemorrhage of moderate degree imme-

diately followed. This vessel was snapped for a minute or two and no further bleeding occurred. Case 4 bled profusely from start to finish of the operation, requiring almost constant sponging. However, this was an unusual case. This woman had had so-called "black smallpox" in her home at Alexandria, Egypt. She was very ill for many weeks and had never fully regained her health. In spite of the hemorrhage which occurred in this case, I have much to be thankful for. When the first tonsil came away I found I had uncovered a very large blue mass which exactly resembled the lateral sinus in the mastoid region. This undoubtedly was a blood vessel of tremendous size for this locality. Case 11 bothered me most of all. The tonsils were of the type which I think you will all agree are the meanest of all tonsils to remove. The body of the tonsils were so adherent to the constrictor muscle that there was no give to them when traction was applied. (These were the tonsils referred to earlier in this paper.) The anterior and posterior pillars were tightly adherent so that dissection was also difficult. The snare wire cut through the first tonsil, leaving a large mass at the base still in place, requiring the use of a second wire. In spite of the operative difficulties encountered, however, there was scarcely any bleeding, which is a splendid tribute to the hemostatic properties of the x-ray radiation on tonsils. A third case bled from a single vein on the posterior pillar, which was snapped for a few moments; otherwise this case had no bleeding. The bleeding in this particular case was quite spectacular since the blood was trickling down the pillar in a single stream in an otherwise perfectly dry throat.

With the exceptions of the three cases just described, the lack of bleeding was truly remarkable. In six or more of the operations no sponges were used at all. Having had this unusual and valuable experience, I am convinced that the average operation on the tonsils can be done in a practically bloodless way. To obtain such desirable results two things are necessary, namely, improved technique and a proper preparation of the operative field. Of the two, I believe the latter is the more important and much the more neglected.

In the majority of cases after operation, recovery was unusually rapid and free from discomfort. One case (Case 9) healed very slowly but I think radiation had little or nothing to do with that. Several of the younger cases were most spectacular in their recoveries.

In two cases moderate-sized clots were found between the pillars 24 hours after operation. No bleeding was noticed during the 24 hours nor did any occur later.

After the tonsils were removed they were preserved in 10 per cent. formalin solution and later sent to Dr. Mallory's laboratory at the Boston City Hospital. After due time Dr. Mallory reported his findings. To quote his own statement to me his findings may be summed up in three words—"Absolutely no change." His technique report is as follows:

"Examination of 14 pairs of tonsils shows varying degrees of chronic inflammation present in all of them. In five different cases one or more colonies of actinomyces-like organisms are found in crypts of one of the pair of tonsils surrounded by masses of lymphocytes.

"The crypts of some of the tonsils contain mases of cornified epithelial cells; others contain either a moderate amount or none at all. In one crypt of one tonsil a collection of polymorphonuclear leucocytes is present, forming a minute abscess.

"The layer of pavement epithelium lining the crypts is sometimes very thin, due perhaps to stretching as a result of enlargement of the tonsils or dilatation of the crypts. It is usually infiltrated with lymphocytes and occasionally with polymorphonuclear leucocytes.

"The lymphoid tissue shows no changes beyond hyperplasia. The germinal centers are numerous and mitosis is fairly active.

"The lymphatics around all the tonsils contain lymphocytes, usually in abundance and often in great numbers.

"The histological picture in all the tonsils is that of a mild chronic inflammatory process with hyperplasia of the lymphoid elements."

The question now arises, "Is tonsillar radiation worth while?"

If it did not require expert knowledge and costly apparatus, the public might be educated to the point where we should radiate all chronically inflamed throats prior to tonsil operations. At the present time, however, radiation presents a peculiar psychological problem. Few patients desire both radiation and operation. They may be willing to undergo either one or the other, but at both they not unnaturally balk. Moreover, comparatively few physicians at the present time are willing to recommend x-ray radiation for fear that ultimate harm may result. This is a fortunate attitude of mind for the medical profession to adopt, since few of them realize the real dangers of radiation. That you may have this important information first hand, I have asked Dr. Butler to briefly outline these dangers and he has prepared the following statements:

"It is essential, for many reasons, that the Roentgen treatment be given by a roentgenologist. The equipment required is quite expensive, highly technical, and very dangerous in unskilled hands. The dangers should be fully appreciated, and these dangers are well known to every roentgenologist of experience. This danger comes from two sources, the electrical circuit and the x-ray activities. The patient must be protected from the possibility of any electrical contact with the tube or wires; air being the best insulator, the tube terminals are

always kept at a greater distance from the patient than the length of the spark gap used (seven inches in this case). Adequate protection against x-ray burns also must be provided; this is accomplished by proper filtration and careful regulation of the dosage. No case should require treatment sufficient to give even an erythema. It was thought at one time that the lower portion of the parotid gland (which is included in the treated field) might be damaged but experience has not borne this out. If an erythema dose is given—which is never required—the effects are seen on the skin first and not in the throat, and this should be clearly understood by the laryngologist. The thyroid is protected by the sheet lead and does not receive any radiation when the method is properly employed. Too prolonged a treatment results in: first, an erythema, later tanning, and if still further carried on, telangiectases might be induced. A small bell can be held by the patient, so that if the position becomes cramped or otherwise too uncomfortable during the treatment, the ringing of the bell will notify the operator to shut off his power and relieve the patient for awhile. This is rarely needed, as the exposure lasts only four minutes, but is a method quite generally employed by careful men. Of course, the operator should remain outside the room or at least behind a lead-lined booth, for the greatest danger is to the man who is constantly being exposed to the activities of the x-ray."

CONCLUSIONS.

Fourteen cases of diseased tonsils x-rayed from one to four times failed to show any clinical or pathological changes as a result of the radiation, except as follows:

During the times the radiations were being given many of the tonsils seemed to be smaller and more normal in appearance, but when subsequently removed by dissection no real change in size appeared to have taken place.

After radiation many of the tonsils appeared to be normal in size and color, but at the time of operation a number of them were found to be filled with pus or cheesy débris. (I regard this to be the most important information gained from our work in this series of cases.)

As a method of reducing bleeding and assisting dissection at the time of operation, radiation is useful.

By diminishing oversecretion from the mucous surfaces of the throat it decidedly decreased the possibility of postoperative pneumonia or lung abscess following throat operations.

In cases wherein diseased tonsils may be justly suspected of producing secondary infections in the joints, heart, kidney or other important organs, x-ray radiations are inadequate.

520 Commonwealth Avenue.

PROMPT ACTION OF RADIUM RADIATIONS IN THE TREATMENT OF SMALL OR LARGE INFECTED TONSILS AND LINGUAL TONSILS.

BY FRANCIS H. WILLIAMS, M.D., BOSTON.

THE readers of the JOURNAL will be interested to learn that my experience shows that improvement in the general condition of the patient usually follows radium treatment of infected tonsils within one or two days, the improvement being more marked if the systemic symptoms are acute, and that the time required to reduce the size of the tonsils differs considerably, some yielding much more readily than others. The former are easily distinguishable from the latter. Usually I now give the former about four treatments at intervals of about two weeks, the length of exposure being varied according to the needs of the case. The method is harmless,* and its use during two years has been so satisfactory that in my opinion the facts concerning both radium treatment and tonsillectomy should be carefully weighed before subjecting adults, especially those who have tonsils that yield readily, to an operation that entails much discomfort and sometimes great danger.

Lingual tonsils are accessible to radium treatment, but are difficult to operate on, as is well known. When large, the relief afforded by radium is most grateful to patients who have suffered for a long period from a sense of fullness in the throat and a persistent cough.

Radium is, of course, useful for the treatment of adenoids and also for the lymphoid tissue on the pharyngeal walls and in connection with affections of the middle ear and around the Eustachian tubes.

*See BOSTON MED. AND SURG. JOUR., Sept. 14, 1922.

NON-TUBERCULOUS PULMONARY ABSCESS.*

BY WYMAN WHITTEMORE, M.D., F.A.C.S., BOSTON.

SOME weeks ago I was called in consultation to see a case of lung abscess. The patient was a spinster of about 50, who had a definite abscess of the lung, but who seemed to be doing well and did not require an operation at that time. When we went down stairs and told her father what her condition was he asked if I was going to operate upon her. The medical man immediately replied that we never operated upon these cases except as a last resort. This is contrary to what I believe should be true. There is always some time during the

*Read before the Springfield Academy of Medicine, October 10, 1922. Read before the Waltham Medical Club, December 7, 1922.

patient's sickness when it is fairly safe to do an operation, but if it is undertaken when he is so sick that it is done as a last resort it will merely hasten his death.

The cases that I shall speak about tonight range over the last five or six years, mostly at the Massachusetts General Hospital, and are those of which I have either had charge or have seen in consultation. I have looked back over the last ninety-seven cases that I have had and have thrown out eleven of these as I believe there is some question as to the exact diagnosis. This leaves eighty-six cases in which I do not think there is any question but that the diagnosis of lung abscess is correct. It should be remembered that statistics from different clinics will vary considerably and it is not surprising to find that in one clinic such as that at the Massachusetts General Hospital there are more cases of upper lobe abscesses than lower lobe, whereas, at some other clinic, such as the Mayos', there appear to be more lower lobe abscesses than upper.

It is very important to make a correct diagnosis before the operation is undertaken because the prognosis is very different when one is dealing with a bronchiectasic condition than it is with a lung abscess. In the latter there is good reason to believe that drainage will produce a cure of the condition, whereas drainage of a bronchiectasic cavity, although it may relieve the septic condition temporarily, will never produce a cure.

The diagnosis can be made previous to operation in a great majority of cases by close cooperation between the medical man, surgeon, x-ray department and laboratory. The surgeon who is going to do thoracic surgery should be in a position to make his own diagnosis.

Etiology: In my series of eighty-six cases, 61% were directly preceded by some operation on the upper respiratory tract done under a general anesthetic. There were 35 cases following tonsillectomy (40%), one case following removal of adenoids, nine cases following extraction of teeth, two cases following operations for septic sinus and one case following operation for the correction of a deviated septum. Out of this total I had only one case that had been operated upon by a nose or throat specialist. It seems only fair to state that out of the thousands of tonsillectomies that are done throughout the country the percentage of these cases that are followed by such a complication as lung abscess is exceedingly small. In this series there has been no case in which an operation was done under local anesthesia. This fact seems to point toward the conclusion that abscesses of the lung are more frequent when tonsillectomies are done under a general anesthetic than when done under local. However, a few cases have been reported, following tonsillectomy done under a local anesthesia, and we must remember that it is a possibility. There are three main theories as to how a lung abscess is produced from a tonsillectomy: (1) infection through the lymphatics, (2) septic infarct from tonsils, (3) aspiration of septic material from the tonsils. It seems to me that the first two may be immediately dismissed from consideration except that in a rare instance the abscess may be produced by infarct from the tonsils. My belief is that these cases are caused by aspiration, and the fact that in the cases at the Massachusetts General Hospital there are more upper lobe than lower lobe abscesses does not disprove this statement because, although the septic material is at first aspirated into the bronchus leading to the lower lobe, the cough produced from the irritation of this material forces it up into the bronchus leading to the upper lobe.

The next most common cause of abscess is broncho-pneumonia. There were thirteen of these cases and only two from lobar pneumonia. This seems to be about the same proportion as that found in other clinics and it appears to be an undisputed fact that abscess of the lung seldom follows lobar pneumonia. There were three cases due to septic infarct. A factor in the etiology that it is well to bear in mind is that abscesses of the lung may be produced from the extension of the infection from outside the lung—for example, from subdiaphragmatic abscess and abscess of the mediastinum. An empyema that ruptures into the lung and bronchus, producing purulent expectoration, must not be confused with abscess of the lung. It seems strange that such an empyema does not produce a lung abscess more often than it does, but in my experience this has occurred very rarely. Foreign bodies, such as teeth and peanuts, that are inhaled into the bronchus, may produce abscesses of the lung, but these cases are usually promptly cured when the foreign body is removed with a bronchoscope. I have never found an actual foreign body in any abscess cavity.

Age: Abscess of the lung seldom occurs under ten years of age. The period of life in which abscesses are most common is during the years between twenty and forty. Recently I had an exception to the rule in an infant twelve months old who had a lung abscess, the etiology of which seemed to be a broncho-pneumonia. It seems to be a fact that lung abscesses in children seldom require operation.

Situation: Abscess due to aspiration in this series was more common in the upper lobe than in the lower lobe in the ratio of about two to one. In 72 cases there were 43 abscesses situated in the upper lobe and 29 in the lower. These figures vary considerably from the figures of other clinics. In 1919 Hedbloom reported 48 cases from the Mayo Clinic, in which 10 were of the upper lobe and 32 were of the lower. In 1922 Lockwood reported 42 cases from the same clinic, 17 of which were in the upper and 22

in the lower lobe. In 1920 Hartwell reported 50 cases, 25 were in the upper and 22 in the lower, and in 1914 Scudder reported 16 cases, 8 being situated in the upper and 8 in the lower lobe.

Autopsy records at the Massachusetts General Hospital show that in the majority of cases the abscess is situated in the periphery of the lung and also in a majority of cases the lung and costal-pleura are adherent. In a series of 30 autopsies the abscess was found in the periphery of the lung in 28, and in a series of 35 autopsies the lung and pleura were adherent in 30 cases.

Diagnosis: It seems to me that a great deal of emphasis should be laid on the importance of taking the history of the patient. In many instances a carefully taken history will point very strongly to the correct diagnosis. It has been my experience that this is often a very difficult thing to get, particularly in hospital patients of foreign extraction. In many instances the patient has had some lung infection extending over a long period of time and just what the illness was at the onset of his trouble he does not know and he remembers very little about it. In most cases of lung abscess the starting of the process is an acute condition. For example, when an abscess follows tonsillectomy, there is pain in the chest; a rise in temperature and signs of pneumonia develop in a few days. This is followed by cough and expectoration of foul sputum. In bronchiectasis the onset is never acute, but is slow and gradual with no definite beginning.

The sputum may vary very greatly in amount. The quantity may range from ½ ounce to 25-30 ounces in 24 hours and it may be fetid or not. Streptococci, pneumococci, staphylococci, and influenza bacilli are the most frequent organisms found. When elastic fibers are discovered this evidence points more towards a lung abscess than a bronchiectasis, but unfortunately elastic fibers are not always found. In this series they have not appeared oftener than once in three cases. The sputum should be examined many times by an expert before operation is undertaken. Tubercle bacilli should be diligently hunted for. If at any time the influenza bacillus is overwhelmingly predominant I believe that the diagnosis will prove to be a bronchiectasis condition rather than a lung abscess. When the sputum shows that there is only one organism, as for example, pneumococci, or streptococci, this evidence points more towards an empyema that has ruptured through into the bronchus than to a lung abscess. It is possible, however, to have a sputum that contains only streptococci and this may have originated from a pulmonary pyemic condition.

The x-ray may be said to be the most important examination, for in many instances it makes the diagnosis, and in all cases it localizes the process more accurately than any other examination, this localization being of the greatest value to the surgeon in contemplating operation. Abscesses situated in the periphery of the lung showing a fluid level are much more favorable for operation than those situated near the root of the lung. It has been my experience that in abscesses situated near the root of the lung there is seldom any fluid level seen either in the x-ray plate or by the fluoroscopic examination.

The physical examination is frequently a disappointing one. The most common findings are dulnes and râles and occasionally there is a case in which there are no physical signs. The classical signs of amphoric breath, tympany on percussion, etc., are often absent. Some surgeons believe that those cases in which there are no physical signs and in which the diagnosis is largely based on x-ray examination are more apt to clear up without operation than those in which there are definite physical signs. I see no reason to believe that this observation is correct.

Abscess of the lung should be differentiated from tuberculosis, bronchiectasis, broncho-pneumonia, malignant disease, perforating empyema and benign tumors of the lung and pleural cavity. It is well to remember that a bloody, pussy sputum may occur in malignant disease when it is breaking down.

Operation: Each case must be decided on its own merits. Each case should be carefully watched so that if at any time the patient is not making a satisfactory convalescence, operation may be undertaken. No definite rules can be laid down. If the sputum is not foul, nor the amount over ½ ounce in 24 hours and there is no evidence of any sepsis, there is no reason to suppose that operation must be done immediately. If, on the other hand, there is a large amount of foul sputum and the patient shows obvious signs of sepsis, operation should be done, regardless of how long the process has been going on. As I pointed out before, the cases in which the abscess is situated close to the periphery, and in which there is a fluid level, are more favorable for operation than those deeply situated. If there isn't any improvement after three or four weeks, or if at any time the patient's condition becomes worse, surgical interference should be strongly considered. It is well to remember that in delaying operation there is always some danger of such complications as septicemia, pyemia and brain abscess. Several years ago a man of 50 had an abdominal operation at the Massachusetts General Hospital and following this developed pneumonia and an abscess in his right lung. In trying to persuade him to have the abscess drained I mentioned the fact that if he were not operated upon there was some possibility of his developing a brain abscess and dying from it. In spite of this he refused and it

was interesting, from my point of view, to see that within two weeks he developed all the symptoms of a brain abscess and died, the autopsy confirming the diagnosis.

There seems to be a considerable amount of difference of opinion as to the number of cases that spontaneously recover. The largest percentage of recoveries under expectant treatment that I have seen is that reported by Lockwood in 1922, which showed that out of 27 cases, 16 were in good health. In this series of 86 cases 11 recovered spontaneously (10%). In Lord's 100 cases only 7 spontaneously recovered.

There will always be a certain mortality following operation in these cases and it will vary somewhat according to the kind of case presented for treatment. It may be that one surgeon will have a large number of cases, most of which are situated in the periphery of the lung and in which the lung and costal-pleura are adherent when operation is undertaken. On the other hand, it may be the expereince of another surgeon that most of his cases are situated around the root of the lung, which is not adherent to the costal-pleura. It seems to me that there can be no question but what the surgeon whose cases are situated in the periphery of the lung will have the lower mortality. The lowest mortality in any series that I have seen reported is in Lord's, in which out of 62 cases operated upon only six died (9%). I am inclined to think that Lord was too kind to the surgeons in going over his cases. In my own cases, out of 52 operated upon eight died, showing a mortality of 15%.

It is discouraging in the surgical treatment of these cases that the convalescence takes such a very long time. The patient will perhaps have a brilliant convalescence while in the hospital, lasting over a period of 4-6 weeks, at the end of which time his general condition has changed from being a seriously septic one to a comparatively healthy one. He has gained in weight, his temperature has been normal for several weeks and his cough has ceased, although there still may be a slight discharge from the sinus. Yet, in spite of this improvement, we have found that if the drainage tube is removed at this time and the sinus allowed to close there will be a recurrence in the majority of cases. Therefore, it is necessary to plan from the beginning of the surgical treatment to continue drainage for a long time. Lockwood reports that the duration of treatment in the hospital at the Mayo Clinic averages 44 days and that the patients usually have been obliged to quit their occupations for 13.75 months.

It seems true that in a large number of cases, particularly chronic ones, the simple drainage procedure used fails to cure the condition as promptly as we should like to have it, but in many instances as long as the sinus persists so that a few drops of pus drain out each 24 hours, the patient's condition remains excellent. If, on the other hand, the sinus closes too soon or the resistance of the patient is lowered from some cause, a recurrence or an exacerbation of symptoms will almost surely follow.

During the last few years surgery has made certain definite advances in the treatment of these cases (1) the exact diagnosis preceding operation is made much better than formerly, (2) the localization of the abscess is more accurately determined, chiefly through more intelligent reading of the x-ray, the sign pointing to the localization of the abscess as they present themselves at operation are more intelligently interpreted, (4) the operative technique has been greatly improved largely through the use of local anesthesia.

Operation: There can be no question but what local anesthesia is the best anesthetic to use. I feel very sure that certain cases of my own in which the operation was done under a general anesthetic several years ago, and who died, would have made a good convalescence if operated upon at the present time under a local anesthetic. When, for some reason, local anesthesia cannot be used gas oxygen is the best one to use. Local anesthesia may be used in two ways: (1) local blocking of the intercostal nerves, at the site of operation, and (2) paravertebral anesthesia. When the latter is used one may operate just as rapidly and in the same way as if the patient were under a general anesthetic, and to my mind it is one of the most brilliant techniques used in local anesthesia. I believe that to safeguard the patient it is necessary to have some form of differential pressure anesthesia at hand in case it should become necessary to use it during the operation.

There can be no question but what the old two-stage method of operating upon these cases is the safest, but unfortunately in using this method as a routine procedure in certain cases the abscess cavity will not be found. In this method a window in the chest wall is opened down to the pleura. Then the lung and pleura are made adherent there by suturing the lung to the pleura or by packing gauze against the pleura and leaving it for a few days. I believe there is too much danger of making a pneumothorax to suture the lung and pleura and it does not seem necessary to do this, as packing gauze against the pleura will produce exactly the same effect. At the second stage if the abscess is situated directly beneath this field, which has been made adherent, it can be readily opened and drained. On the other hand, if the abscess is not in this position the chances are that it will never be found, as the field through which the surgeon may go is a very limited one.

It is necessary in my opinion to find the abscess at the first operation. This is accomplished by a careful inspection of the pleura and palpation through the pleura. If the approach to the abscess has been correct the pleura will be found

thickened, grayish white and firm. On the other hand, if this approach is not the correct one the lung will be seen moving up and down beneath a normal pleura with each respiration. In this case the incision should be enlarged and one or more ribs further resected, and again the pleura should be inspected and palpated. As we know, in a large majority of cases the lung and pleura are adherent, and in these instances we should be able to find the adherent area. However, in a small percentage no adherent area will be found, and then some form of differential pressure anesthesia should be used and the pleural cavity opened. The lung should be palpated, the abscess localized, and the region of the lung in which the abscess is situated should be brought up to the chest wall and sutured there. Gauze packing should also be used in order to hasten the formation of adhesions. After three or four days the abscess can safely be opened. If, for any reason, it is decided that the patient's condition is such that waiting several days before the abscess is opened is not warranted, it may be drained at once, but in at least 50 per cent. of such cases an empyema will complicate the convalescence.

There are two proofs of finding the abscess: (1) actual pus is seen after opening into it; (2) no actual pus is seen but the operator is greeted by a blast of foul air, which has exactly the same odor as the patient's breath. If this area is drained pus will be found coming out within 24 hours. If the surgeon's sense of touch has been educated well it is a simple matter for his fingers to recognize the fact that it has gone through inflammatory tissue and has suddenly broken into the abscess cavity.

At the Massachusetts General Hospital we have tried many different ways of draining these cavities, and from our experience feel that the best method is the use of a very soft rubber tube surrounded with gauze. After a few days the position of the tube should be changed once each 24 hours in order to avoid the danger of having the end of the tube ulcerate through into a large vessel and thereby produce a fatal hemorrhage.

It seems to me that the only abscess that can be considered cured is one in which after the treatment is finished there is no longer any cavity, for the reason that if there is a cavity left behind there will probably be a recurrence sooner or later or some other symptoms such as occasionally a mild hemorrhage will appear. The only way in which the abscess cavity may become obliterated is by the formation of scar tissue and this takes a very long time. It is necessary, therefore, to drain the acute cases for five to six weeks or longer and the chronic ones practically indefinitely.

SUMMARY.

1. Many cases could be avoided by better technique in operations on teeth, tonsils, adenoids, etc.

2. It seems possible to make a definite diagnosis in most cases before operation.

3. If there is not any improvement in three or four weeks, operation should be carefully considered. I believe that the chances for a permanent cure are much better if the patient is operated upon as a subacute case rather than delaying surgical treatment until the condition becomes chronic.

4. The mortality will vary according to the kind of case presented for treatment.

5. It seems fair to give each patient a chance to cure himself by postural drainage and building up of his general condition before operation is advisable. But, if at any time the patient's condition ceases to improve or becomes worse, operation should be performed.

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Medical Progress.

PROGRESS IN PEDIATRICS.

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PYLORIC STENOSIS IN INFANCY.

Pathology.—Wollstein has verified the findings of previous observers as to the pathology of this condition. She found that the changes are limited to the submucosa and the circular muscular coat. The mucosa is unchanged. The absence of any evidences of an inflammatory lesion of the mucosa shows that the vomiting is entirely mechanical. The submucosa is often edematous, and thus appears wider than usual. The circular muscular coat is often two or three times thicker than normal. The increase in thickness is due simply to a larger amount of muscle tissue in the circular coat. The connective tissue between the muscle cells is not increased or thickened. The serosa is normal. She found that the normal thickness of the pyloric circular muscular coat in babies under three months is not over 2.5 millimeters, with an average of 1.6 millimeters. The hypertrophic pylorus varies from 3 to 7 millimeters in thickness, with an average of 4.4 millimeters.

The normal length of the pylorus varies between 1 and 1.5 centimeters. In hypertrophic stenosis it varies between 1.5 and 3 centimeters. Haas agrees that the tumor contains no foreign tissue, and that it is made up simply of muscular fibres, especially the circular. Palmer claims that it is edema which makes the tumor pale, and gives it the "cartilage feel." Ladd describes two kinds of tumors, on the basis of their gross pathology, one in which the pylorus is hard, inelastic and, when cut, hardly bleeds at all, the cut surface being white and appearing almost like cartilage. On spreading the incision the mucous membrane frees readily from the muscular layer and pouts up into the wound. In the other type the tumor is sometimes as large, but is soft, elastic, and bleeds freely when cut. The muscular and mucous layers are not easily separated. He thinks this type may represent pylorospasm.

All the authors who mention it agree that the tumor persists after gastroenterostomy, and that the food continues to pass through the new opening instead of through the pylorus. Ransohoff and Wooley, Rachford, Downes, Holt and Wollstein report a number of cases, which died from six months to two years after recovery after the Rammstedt operation, in which the tumor had entirely disappeared. Rachford's and Wooley's cases were presumably the same, and it is also presumable that Holt's, Downes' and Wollstein's cases were identical.

Holt quotes Howland's case, in which the tumor was present in a child who died four months after recovery, without operation, and mentions cases of his own in which the tumor could be felt for weeks after the cessation of vomiting. Sauer found a typical cartilaginous hypertrophy of the pylorus in a baby which died of gonorrheal peritonitis some months after complete recovery from all the symptoms of pyloric stenosis, and gives references to a number of other cases in literature in which the cartilaginous tumor was found at autopsy months or years after recovery from pyloric stenosis, without operation. Samson and Baare found the pylorus stenotic and hypertrophic and 5 centimeters long in a baby that died of miliary tuberculosis at eight months, several months after complete recovery from the symptoms of pyloric stenosis. Other authors refer to cases in which the tumor was palpable for many months after the cessation of symptoms. I have been able to find no cases in which a normal pylorus was found at autopsy in babies or children who were supposed to have recovered from pyloric stenosis under medical treatment.

Etiology.—The same confusion in the use of terms prevails as in the past. American and English authors, as a rule, use the terms stenosis and spasm to describe different anatomic conditions, stenosis being applied to the condition in which there is an absolute overgrowth of muscular tissue at the pylorus, and spasm to the condition in which there is obstruction from contraction of the pyloric muscles, without overgrowth of tissue. Continental writers, on the other hand, either apply the term spasm to hypertrophy or do not distinguish between obstruction from overgrowth and from contraction. Most of them deny the possibility of obstruction from simple muscular contraction. This confusion in terminology often makes it very difficult to determine just what the writers are describing and discussing, and just what they mean. The same difference of opinion prevails as to the etiology as in the past, although several new hypotheses have been advanced. The same difference of opinion also exists as to whether simple spasm of the pylorus can cause the symptoms of obstruction, and as to whether hypertrophy is due to spasm or spasm complicates hypertrophy.

Holt says that the division into spasmodic and hypertrophic types is not admissible. He says that the cases of true hypertrophic stenosis differ much in degree, and that in very few is the obstruction complete. Hypertrophy, undoubtedly congenital, is the essential lesion in all, spasm being added as a secondary condition. It is inconceivable that the hypertrophy found at operation, two or three weeks after birth, could have developed as the result of spasm. He holds that persistent spasm of the pylorus without hypertrophy has not yet been established. Assuming that the hypertrophy is congenital, it is evident that hypertrophy alone does not often produce sufficient narrowing to cause symptoms in infancy. They do not usually begin until spasm is added. He believes that the hypertrophy persists after the spasm has subsided. The symptoms may subside completely and, so far as one can positively say, permanently. On this account many regard the essential condition as pyloric spasm, and believe that when this has disappeared the patient is well. He can not subscribe to this view, and believes that symptoms may reappear later in life. Several American writers, however, do not accept or agree with Holt's position. Levy, as he frequently did not find a tumor on opening the abdomen, when it had been felt before through the abdominal wall, evidently believes that tumor may be due to spastic contraction. Helle has also failed to find the tumor at operation in the very cases in which it was felt most distinctly before operation. Nevertheless, he states that he thinks a slackening of the tumor under the finger to be impossible. His findings corroborate Pfaundler's opinion that pylorospasm may exist without tumor. He believes that the clinical picture is not caused by the tumor, but by subsequent secondary spasms of unknown etiology. Barret, on the basis of his x-ray examinations, distinguishes stenosis and spasm and believes them to be distinct

entities. Ladd distinguishes between stenosis and spasm, because of the differences in the character of different tumors, which have been described above. Finkelstein reports a case in which a baby had all the signs of obstruction in the pylorus, visible peristalsis, tumor and vomiting. The tumor, however, was not as hard as usual. The baby died on the forty-ninth day. The autopsy showed a normal pylorus and stomach muscle. The muscle was only 3.7 millimeters in thickness, and the pylorus yielded to 22 cm. of water pressure. Previously, he did not believe in simple spasm, but now thinks that this case proves that there may be simple spasm of the pylorus, which can be distinguished only anatomically from the hypertrophic form. Clinically, it is indistinguishable, unless by the less density of the tumor. Harrison says that persistent spasm is yet to be proved, and should no longer be countenanced as a clinical entity, as it often leads to delayed operation for the true condition. Strauss apparently disbelieves in simple spasm of the pylorus. Palmer disbelieves in spasm, and thinks that it is edema of the pylorus which causes the changes in the symptoms which are attributed to spasm. Moore, in one of his cases, had a recurrence of the symptoms after a Rammstedt operation, which he attributed to spasm. These symptoms were relieved by atropin.

Tumpeer and Bernstein injected paraffin into the muscle ring of the pylorus of six dogs, in several places, in order to get obstruction all the way around. These dogs were observed up to seven months. The emptying time of the stomach was studied. Gastrotomy was done later, and stomach tracings made. The dogs were autopsied and examined in gross and microscopically. Peristaltic contractions of the stomach appeared immediately after the operation. There was no vomiting after the first two days. The emptying time of the stomach was then studied with apomorphin. At post mortem there was no dilatation of the stomach, but the lumen of the pylorus was almost closed. The mucosa was thrown into folds. Connective tissue had invaded the paraffin mass. They conclude that, although the anatomic conditions of hypertrophic stenosis were reproduced, the picture of pyloric stenosis did not develop. The immediate development of peristaltic contractions of the stomach suggests that the tumor of pyloric stenosis acts as a foreign body, and tends to cause local contractions. The similarity to fibroid tumors of the uterus is suggested. It appears from the failure to produce obstructive symptoms, despite marked anatomic obstruction, that the clinical picture of hypertrophic pyloric stenosis is not due to the anatomic condition alone.

Thomson believes that the essential cause is entirely obscure, but concerning how this unknown cause produces the muscular overgrowth, which is the primary structural characteristic of the disease, he favors the theory which regards the muscular hypertrophy as secondary to some form of antecedent overaction resulting from long-continued inharmonious working of the various elements of the muscular mechanism controlling the emptying of the stomach. Aballi and Nogueira accept as the etiology an arrhythmia of the gastric contractions, leading to disturbances of the physiologic laws of the functions of sphincters, which play their important rôle in obedience to various stimuli. Strauss refers to the finding of pyloric tumors in the fetus, and in the new-born, and states that in his 65 cases the size of tumor was absolutely proportionate to the age of the infant. He believes that the condition begins during the fetal development of the stomach, and is brought about by the rhythmic contractions of the pylorus, which undoubtedly start at that time, and is due to an abnormal stimulation from the intrinsic or extrinsic nerves of the stomach. The condition of hypertrophy must progress very slowly during fetal life, but becomes accentuated after birth, owing to the additional irritation produced by the taking of food. Bókay states that a considerable proportion of the cases of pyloric stenosis in infancy are not due to hypertrophy in the anatomic sense, but the hypertrophy develops as the result of spastic contraction of muscle.

Haas believes that pyloric stenosis is merely an advanced degree of pylorospasm, and that it is only a single manifestation of a general state whose etiologic factor is an overaction of the vagus portion of the autonomic nervous system, and usually a hyperexcitability of all the motor functions. He gives as facts in support of this view that these cases can all be cured by atropin, that the tumor contains no foreign tissue, but is simply a hypertrophy of the circular muscular fibres, and that autopsy, after the Rammstedt operation, has shown a complete absence of tumor. Furthermore, occlusion of the bowel causes hypertrophy of the muscular coat which is manifest in four or five days, and easily recognizable in nine days. In many cases, when the lumen is narrowed, no hypertrophy occurs above. Some other factor must, therefore, be present. Irritation of the serous coat of the intestines by crystals of sodium chloride causes obliteration of the lumen. Lead colic is relieved by atropin. The normal pylorus may remain contracted post mortem. Spasm of the sigmoidorectal sphincter may be produced by atropin, the innervation in this region being from the sympathetic. He believes that the differential diagnosis between spasm and pyloric stenosis is impossible. Gray and Reynolds, however, do not agree with Haas that pyloric closure is controlled by the vagus. They maintain that his results from atropin are due to diminution of secretion and shrinkage of the

mucosa rather than to any effect on the pyloric sphincter.

Pirie believes that the spasm inducing hypertrophy is primarily due to hyperadrenalism before birth, and that other subsidiary postnatal causes determine the persistence or recurrence of the spasm. This condition is due to a lack of balance between the secretions of the various endocrinic organs in the process of their development and involution, which may result either in a relative or an absolute hyperadrenalism. The hypertrophy exists from before birth. It is the degree of added spasm that determines the onset of symptoms. He admits that no lesions in the adrenal have been found at autopsy, but claims that it is not necessary for any abnormalities to be apparent after birth, because the adrenalism is ante-natal. In his summary in a paper by Gray and Pirie he states:

1. Congenital pyloric hypertrophy is the result of prolonged ante-natal spasm induced by hyperadrenalism.

2. Pyloric obstruction is completed by two secondary influences — (*a*) retention gastritis, with consequent swelling of the mucosa; (*b*) added spasm due to several causes; foremost by phimosis.

3. The final results in the closure of the pyloric orifice are—(*a*) absence of acid chyme in the first part of the duodenum, leading to (*b*) failure of secretin formation, leading to (*c*) suppression of pancreatic secretion. These factors themselves further induce (*d*) inhibition of the normal pyloric relaxation, and establishment of the "vicious circle." Shipley and Blackfan, however, state that this theory assumes the so-called reversed innervation of the gastrointestinal sphincters, that is, that the pyloric and ileocolic sphincters are augmented through the splanchnic nerves, and depressed by way of the vagus, in contradistinction to the bulk of the intestinal musculature. They claim that this theory is not founded upon observation, since almost nothing is known about the behavior of the intestines during intrauterine life. They have studied the physiology of the gastrointestinal tract in the fetus, both in pigs and in the human. The result of applying adrenalin to the pyloric sphincter is an inhibition and relaxation. Increased secretion of adrenalin can, therefore, hardly result in anything else than a decrease in the tone of the pyloric musculature. They believe, therefore, that hypertrophic stenosis can not be explained upon the basis of Pirie's theory.

Heusch states that in most new-born infants there exists a relative thickening of the pylorus, which disappears, as a rule, in older children. The pathologic persistence of this normally transient condition is the primary anatomic factor in the production of pyloric stenosis. In connection with an abnormal local irritability of the infant's stomach—the primary physiologic factor—a secondary hypertrophy of the annular muscle results, which is manifested by a thickening of the muscular coat and the tumor formation resulting therefrom. The primary anatomic attacks provoke secondary spasms in early infancy. Sixty per cent. of the nervous affections of the pylorus occur in first-born children, who are known to be more nervous than those born later. The hypersensibility of the motor nerves of the stomach is a pathologic condition of the first month of infancy, and this disease very rarely occurs after the second month. The unstable condition of the gastric motility appears to cease about the sixth week.

Palmer states that the lumen of the pylorus of the new-born is about the size of a lead pencil, and that there may be any degree of hyperplasia of the pyloric sphincter up to one which closes the lumen. The pyloric aperture normally grows in diameter because of growth and use. In cases in which the pyloric sphincter shows only a little hyperplasia, the natural growth of the opening carries it in a few weeks or months past the point at which this slight encroachment of the muscle wall on the normally small lumen can cause obstructive symptoms. The baby actually outgrows the mechanical condition causing the symptoms, and believers in spasm say that the spasm has been cured. He does not believe that there is any such thing as spasm of the pylorus, and thinks that the variation in the symptoms is due to edema.

Symptomatology.—All the authors agree on the general symptomatology of pyloric stenosis. They differ materially, however, in their estimates of the relative importance of individual symptoms. It is very difficult to always be certain, if one believes in spasm of the pylorus as an entity, whether they are describing spasm of the pylorus or true hypertrophic stenosis. Thomson divides the disease according to symptoms into four stages:

1. Stage without symptoms.

2. Stage of primary symptoms—violent vomiting, retention of food in the stomach, drying of the tissues, arrest of gain in weight, visible peristalsis.

3. Stage of secondary symptoms—emaciation, debility, dilatation of the stomach, toxemia.

4. Stage of recovery, if the child survives, in which the muscular incoördination of the organ becomes normal, the peritoneal coat gradually widens, the muscular hypertrophy subsides, and the lumen enlarges.

He believes that the disease is self-limited. If the baby does not die of inanition, the natural processes of growth and development will, in time, remove the obstruction. He believes that there are two types of the disease: the mild, which never requires operation, and the severe, which demands immediate operation. Ernberg and Hamilton also say that it is well known that there is a tendency to spontaneous

recovery. Several other writers, while they do not state this so plainly, evidently assume it.

Peristalsis.—All authors mention peristalsis as one of the most common and prominent symptoms. Thomson emphasizes its importance, and Downes says that it was lacking but once in his series of 175 cases.

Tumor.—There is considerable difference of opinion as to how often a tumor can be felt, and of how much importance it is in diagnosis and as an indication for operation. Downes states that in only two of the 217 cases, on which he has operated, has the anteoperative diagnosis of tumor at the pylorus been proved incorrect. Levy, on the other hand, says that the tumor frequently cannot be felt in serious cases, and that it is frequently not present on opening the abdomen, when it had been felt before through the abdominal wall. Ladd believes that there are many cases in which it is impossible to feel the tumor, because of the deep and high position of the pylorus under the edge of the liver. He does not think that the presence of a tumor necessarily means a true case of stenosis. Gray and Pirie, on the other hand, believe that a tumor is essential for diagnosis, and that it is the one certain sign. Thomson thinks the tumor is most important. Helle says that the tumor is absent at operation in the very cases in which it is most distinct before operation. It was distinctly palpable before operation in only three of his twenty cases. (It would seem as if some authors were confusing spasm and stenosis, and that some were more expert than others in feeling tumors.) In Scott's case, in which the symptoms did not develop until the baby was 21½ months old, no tumor was felt before the operation, although a typical tumor was found at that time. No tumor was found in Glover's case, with atypical symptoms, until the autopsy. Holt, Sauer, and others call attention to the long persistence of the tumor after the disappearance of other symptoms in cases which are recovering under medical treatment. Sauer, especially, emphasizes the lack of importance of a tumor in the absence of other symptoms.

Haas calls attention to a number of other symptoms which he says are characteristic of pyloric stenosis. Some of these are pallor, lividity, loss of turgor, circumoral cyanosis, cold, clammy, cyanotic hands and feet, and subnormal temperature, unless it is obscured by a starvation temperature. He states that there is spasm, not only of the pylorus, but also of the larynx, pharynx, œsophagus, cardia, and various portions of the intestine, with hypertonicity and spasm of the skeletal musculature, even to the degree of opisthotonos, often presenting the classical picture of infantile tetany.

Diagnosis.—For those who believe that there is no such entity as simple spasm of the pylorus, there can be, of course, no differential diagnosis between spasm and stenosis. For those who believe that there is such an entity as simple spasm, there are certain points of difference. Some call attention to the intermitteney of the tumor in spasm, and its constancy in hypertrophic stenosis. Others say that the apparent intermittency depends on whether the observer happens to feel a tumor at the given time or not. Finkelstein thinks that, in spasm of the pylorus, the tumor may feel less dense than that of hypertrophic stenosis. Ladd states that the presence of a tumor does not necessarily mean a true case of stenosis. He describes two types of tumors found at operation. In one the pylorus is hard, inelastic and, when cut, hardly bleeds at all, the cut surface being white and appearing almost like cartilage. On spreading the incision the mucous membrane frees from the muscular layer and pouts up into the wound. In the other type the tumor is sometimes as large as in the first, but is soft, elastic, and bleeds freely when cut. The muscular and mucous layers do not separate easily. He thinks that these tumors may represent pylorospasm. Helle believes that a slackening of the tumor under the finger is impossible.

Roentgen Ray.—There is much difference of opinion as to the value of fluoroscopic examination and roentgenograms after a bismuth or barium meal, both as to the diagnosis of obstruction and as to that between spasm and obstruction. Downes states that, because a correct diagnosis is possible in more than 90 per cent. of the cases on the clinical symptoms and the finding of a tumor, he has not thought it necessary to resort to the x-ray as a means of diagnosis in the average case of pyloric stenosis. Furthermore, he warns of the danger of delaying for a bismuth meal in serious cases. Thomson states that he has never found it necessary to use it as an aid to diagnosis in this disease. He depends on the presence of visible peristalsis or tumor, and the stomach tube. Ladd feels that the x-ray is very valuable in diagnosis, and has seen no bad results from its use. He regards it as an important aid to diagnosis between spasm and stenosis. Barret places great importance upon it. He describes the early radiologic syndrome of stenosis as follows:

Peristalsis is exaggerated, the stomach appearing to be divided by the contractions into several lobes. The waves have an abnormal location, reaching points in the vicinity of the upper pole of the stomach. The rhythm of the peristalsis is modified. Phases of hypermotility are succeeded by phases of fatigue, during which the stomach walls are distended and inert. In stenosis, the evacuation of the stomach is more or less delayed, but this delay remains constant in a given case, and is governed by the energy and frequency of the peristaltic waves. In spasm, on the other hand, the evacuation takes place in an irregular manner. Nothing passes through the pylorus during the spastic period, while the stomach empties freely and rapidly

after it is over. Spasm and stenosis may be associated. Evacuation is then governed by these two elements, and it is possible to determine, up to a certain point, the part played by each.

Strauss says that fluoroscopic examination is the most important means of making an accurate diagnosis. It not only shows whether the case is one of pyloric stenosis, but classifies the case immediately as to whether the patient should receive medical or surgical treatment. The method is absolutely exact. He says that roentgenographs are unsatisfactory, because they are usually taken when the baby is flat on the back. This allows the bismuth in the dilated stomach to accumulate on the left side of the vertebrae, and no peristaltic waves are stimulated in the pyloric region. He places the baby under a horizontal fluoroscope, and watches the passage of bismuth milk into the stomach. If the baby is allowed to lie flat on its back, the bismuth meal gathers on the left side of the vertebrae as a large round mass, and will lie there indefinitely. If the baby is rotated to the right side, almost on to the abdomen, the bismuth gravitates to the pyloric end, and peristaltic waves appear immediately in the pyloric antrum and the pylorus. A small amount of the bismuth is squirted through, and then the pylorus clamps down tightly. Peculiar and characteristic snakelike peristaltic contractions can be seen immediately in the pylorus, which are independent of the rest of the stomach. These contractions are absolutely pathognomonic of the condition. He examines again at the end of two hours and four hours. He says that he has standardized the emptying time so that any case in which one half or more of the bismuth milk remains at the end of four hours is recognized as a case of pyloric stenosis, and surgical interference is indicated. The case in which 70 per cent. or more of the bismuth milk has passed through the pylorus at the end of four hours can, as a rule, be cured medically.

Sauer says that the estimation of the amount of bismuth milk left in the stomach at the end of four hours requires a lot of experience, to say the least. He took x-rays immediately after and one, two and four hours after giving bismuth milk, and after giving bismuth milk to which had been added enough farina to make it thick. In the first series most of the bismuth milk was still in the stomach at the end of four hours, irrespective of the position of the child. In the second series the food quickly passed into the duodenum, and the stomach was nearly empty at the end of four hours. According to Strauss' standard, this infant would need operation. She was not operated upon, was given thick cereal, and gained 34 ounces in 30 days. She died of gonorrheal peritonitis somewhat later. A typical cartilaginous hypertrophy of the pylorus was found, in spite of the fact that she had been absolutely free from feeding disturbances.

Stomach and Duodenal Tubes.—Holt and Thomson place considerable reliance on the use of the stomach tube to determine the residue remaining in the stomach. Palmer approves of the duodenal tube as a means of diagnosis of the degree of obstruction.

Treatment.—Both medical and surgical treatment are recommended. There is great difference of opinion as to which form of treatment to use, according to the individual conception of the disease, and the results of individual experience. Some authors believe in medical treatment entirely, some in both medical and surgical, and some in surgical treatment entirely. Those who believe in both medical and surgical treatment differ materially as to the time to change from medical to surgical. It is very difficult to compare the results of the two forms of treatment, because of the difference in the points of view of the writers, and because it is very possible that different men are talking about different types of cases.

Those who believe that there may be pure spasm without hypertrophy naturally favor medical treatment for this condition. Ladd believes that, when the tumor is soft, elastic and bleeds freely when cut, it probably represents pylorospasm, and should not be operated upon at all, certainly not by the muscle-splitting operation. Helle, on the other hand, says that, even if no tumor is found, the muscle should be split.

Haas believes that atropin will overcome the underlying fault. He says that it must be fresh in order to be active. It must be freshly prepared from the crystals, as it deteriorates rapidly in solution. No more than one ounce should ever be ordered at one time. He uses the one to one thousand solution. The dose is the same by mouth and subcutaneously. It should be given subcutaneously until the vomiting stops, and then by mouth. The beginning dose is 1/1000 grain with each feeding. This may be increased as necessary. He has used as much as 16/1000 grain at each feeding, amounting to $\frac{1}{8}$ grain in twenty-four hours. He increases the dose until the vomiting is relieved or flushing of the face occurs. He then continues with this dose. Treatment is usually needed for some months. His extremes are two weeks and one year. It sometimes causes constipation from sigmoidorectal spasm. If it does, it should be omitted temporarily. He also says that errors in diet and hygiene must also be corrected, and all possible assistance be rendered to the organ. Saline solution should be given subcutaneously until fluid can be taken by the mouth. Stenström reports favorable results in several cases. Moore saw peristalsis and tumor appear while the baby was taking atropin, but atropin apparently relieved spasm after operation. Ernberg and Hamilton have found atropin useless.

Bókay used papaverin hydrochloride in eight cases on the basis that it diminishes the tone of smooth muscles. In three cases, in which there was a distinct tumor, it disappeared. All recovered. He says that the dose must not be too small, and that it may be given safely for a long time. He used from 0.01 to 0.02 grams daily, subcutaneously. He believes this to be the best form of medical treatment, and thinks that it should be given a trial before resorting to operation. He refers to the work of Pol, Holzknecht and Sgalitzer, and others.

Pirie, and Gray and Pirie, believe that the contributory or secondary causes of spasm should be removed as far as possible before resorting to the Rammstedt operation. They recommend especially circumcision or the freeing of adhesions, if there is phimosis, and report a number of cases either benefited or cured by this procedure.

Pehu, Holt, and Thomson recommend treatment by lavage. Levy says that lavage should never be used more than once a day. Sauer does not wash out the stomach, and Ernberg and Hamilton say that it is useless in most cases.

Samson and Baare have treated two cases successfully by the continuous drop method. A nasal tube is fixed in place with plaster. One hundred and fifty c.c. of cool whole milk is then given in 1½ hours once or twice daily. They say that this meets Ibrahim's condition of feeding small amounts and sparing the sphincter by exclusion of the stimuli from distention and tension of the stomach. Holt and many others recommend breast milk as the best food, although there is considerable difference of opinion as to how much should be given at a feeding, and how often it should be given. Some advise undiluted breast milk, and others diluted.

Stenström strongly advocates frequent small feedings. Several writers call attention to the fact that after operation, even if the food is able to pass out of the stomach, the intestine will not be able to take care of large amounts for a time.

Many authors call attention to the great importance of replacing the fluid which has been lost. Among them are Stenström, Holt, Wilson, Ernberg and Hamilton, and Sauer. Some advise the use of salt solution, and others that of Ringer's solution. Some give it by mouth, some by enema, some by the Murphy drip, and others subcutaneously.

Sauer, on account of the good results obtained by Hahn and McClure in the treatment of the neurotic vomiting of infancy with thick cereals, thought it logical to use them in the treatment of pyloric stenosis. He used a mixture made up of skimmed milk, 9 ounces; water, 12 ounces; farina, 6 tablespoonfuls; Dextri-maltose, 3 ounces.

This gives a proportion of one part of cereal to seven of milk and water, and the mixture contains about 15 per cent. of cereal. It is boiled in a covered double boiler for an hour, and must be sufficiently thick to adhere to an inverted spoon. He gives from two to six tablespoonfuls six or seven times daily. Sometimes, however, he gives four feedings of the cereal mixture and three breast feedings, or uses breast milk in place of cow's milk in the cereal. The cereal mixture is put in the mouth with a tongue depressor and scraped off with another. The baby is placed on its right side for a time after each feeding. He thinks that the immobile cereal cannot be ejected from the stomach by the sudden explosive contractions that produce vomiting of milk feedings. The thick cereal remaining in the stomach can be moved along by the slow peristaltic contractions of the stomach wall. Liquid foods will pass through the pylorus after from five to eight weeks. He then gradually substitutes liquid feedings. He disregards a palpable tumor and peristaltic waves, if there is no vomiting.

He advocates trying thick cereal first to see if the patient will improve. He watches the general condition of the patient, the stools, urine, vomitus, weight, food and feeding technique. The presence of a palpable tumor or the size of the peristaltic waves has no influence in the decision regarding an operation. The weight, severity of the vomiting, paucity of fecal material, complications, and the general condition are the factors that determine how long thick cereal feeding may be tried. If, after one or two weeks, the vomiting fails to subside, the weight fails to increase or the general condition gets worse, he advises operation. In certain cases immediate operation may be advisable. He reports thirty-five cases. One died while taking thick cereal. Seven were operated upon and five of these recovered. He advises the continuance of thick cereal feeding, if vomiting continues after operation. He admits that the explanation of the success of this treatment is difficult, but thinks that Moritz' observation that, in the adult, solid food inhibits and water stimulates gastric peristalsis, and Schüle's that fluid foods increase the motility of the stomach, may suggest the reason.

Porter reports ten cases successfully treated with the thick cereal mixtures. As farina caused fermentative diarrhea, he substituted rice flour for it, and thinks that it is preferable. He says that rice paste is more easily soluble under moderate degrees of heat, and thinks that they are better protected colloids and, therefore, inhibit the pyloric reflexes more. He feeds the mixture with a Hygeia nipple, the end of which has been slit with a very sharp knife. He puts it in the nipple with a spoon. Moll reports three cases successfully treated in this way. It is doubtful, however, if they were really cases of hypertrophic stenosis. Levy believes that stenosis of a surgical degree is the exception, and that the prognosis with correct medical treatment is excellent. He uses a gruel feeding

made up of skimmed milk, 10 ounces; water, 10 ounces; farina, 6 level tablespoonfuls; Dextrose, 4 tablespoonfuls.

The general belief is that splitting the pylorus, known as the Rammstedt, Fredet-Rammstedt or Weber-Rammstedt operation, is the preferable operation. Strauss, however, claims that his operation of pyloroplasty is preferable, and Helle recommends gastroenterostomy instead of the Rammstedt operation, if there is atony of the stomach. Many writers emphasize the great importance of overcoming dehydration before operation, and believe that it makes a great difference in the results. They also recommend preparing for the operation in other ways as well as possible. There is a good deal of difference of opinion as to the anesthetic to be used. Some recommend operation under local anesthesia, and others gas-oxygen. Most operators, however, apparently are still using ether.

There is a great deal of difference of opinion as to the time for surgical intervention. Palmer, Helle and Ladd advise early operation. Downes says that if the baby is observed from the beginning or a good history is obtainable, medical treatment is justifiable for from seven to ten days, provided the baby does not lose more than 20 per cent. of its weight during this time. If it is not losing weight, and the symptoms are improving, it is safe to continue medical treatment. If there is no definite improvement, or, if relapse occurs when the symptoms have been improving, operation should be done.

Holt states that if the baby is seen in private practice, with possibility of the best care and most intelligent feeding, particularly breast feeding, if the case is stationary or loss in weight is not great, and the baby is still in good condition, if the vomiting is only two or three times a day, if the stools are fecal, waiting should be advised. On the contrary, if the weight has fallen to six pounds or below, and the loss is still going on, if the vomiting is continuous, if there is marked gastric retention, if the stools contain no fecal matter, no time should be lost, but immediate operation advised, particularly in a hospital.

Kerley states that the presence of a palpable tumor demands prompt surgical interference, and that sudden and unexpected death in cases treated palliatively is not uncommon. Holt also says that the more he studies the matter, the more he is convinced that the treatment is operative. Wilson thinks that medical treatment should be tried if less than 20 per cent. of the best weight has been lost, and a No. 14 French catheter can be passed through the pylorus. If 20 per cent. of the best weight has been lost, the Rammstedt operation should be done at once. Others agree with this 20 per cent. limit, which is probably based on the findings of Goldbloom and Spence, that the mortality after the Rammstedt operation was nearly six times as great in babies that had lost 20 per cent. or more of their best weight than in those who had lost less than 20 per cent. of their best weight. They also found that the mortality was three and one-half times as great in babies weighing seven pounds or less than in those weighing more than seven pounds.

Strauss decides whether to operate or not on the amount of bismuth milk which leaves the stomach in a given time. If 70 per cent. or more of the bismuth milk has passed through the pylorus at the end of four hours, he thinks that the case can, as a rule, be cured medically. Sauer calls attention to the fact that it must be very difficult to determine whether 70 per cent. of the bismuth meal has passed or not. Sauer bases his decision on the weight, the severity of the vomiting, the paucity of fecal material, and the general condition of the patient, rather than on the presence of peristaltic waves. Bókay thinks that papaverin should be tried first in all cases.

Statistics.—It is very difficult indeed to compare the statistics under medical and surgical treatment, because of the difference in the point of view of different writers, the difference in the time at which operations were done, and the possibility that the cases treated did not all belong in the same class. Sauer reports thirty-five cases, one of which died while taking thick cereal. Seven were operated upon and five recovered. Porter had ten cases recover under the thick gruel treatment with no deaths. Ernberg and Hamilton report fifty-seven cases treated medically at the Sachs Baby Hospital, Stockholm, with a mortality of only 3.5 per cent. Haas has treated forty or more patients with atropin, and had only two deaths.

Strauss has operated on 107 cases by his method, and had only three deaths, a mortality of less than 3 per cent. Ladd reports a mortality of four in twenty-six cases, or 15.3 per cent. Helle has had only one death in twenty cases, a mortality of 5 per cent. Downes has had thirty deaths in 175 cases operated on by the Fredet-Rammstedt method, a mortality of 17.1 per cent. The mortality was, however, only 8 per cent. in the cases operated on four weeks or less after the onset of the symptoms.

Goldbloom and Spence conclude from their study of 163 Rammstedt operations at the Babies' Hospital, New York, that the condition of the baby at the time of operation is the most important factor in prognosis. Most, if not all, of these cases are probably included in Downes' series. They state that the duration of the symptoms prior to operation is probably the most important single factor affecting the prognosis. When the symptoms have lasted less than four weeks, the mortality is only one third as great as when they have lasted four weeks or longer. The mortality in artificially fed babies is more than three times that in breast-fed babies.

It is three and one half times as great in babies weighing seven pounds or less as in those weighing more than seven pounds. The mortality increases in direct proportion to the amount of weight lost previous to operation. The mortality in those who had lost less than 20 per cent. of their best weight was 6.58 per cent., while it was 37.35 per cent. in those who had lost 20 per cent. or more of their best weight.

Final Results.—It is well known that after gastroenterostomy the pyloric tumor remains unchanged, and that the food continues to pass through the new opening. The result is entirely different, however, after the splitting of the pylorus. Ransohoff and Woolley, and Rachford, report a case, which died four months after operation, in which there was no longer any hypertrophy of the muscular tissue, and the pylorus was like a ring-shaped muscle with a tendon at one point. Wollstein has studied twenty-three cases which died from twenty-four hours to two years after the Fredet-Rammstedt operation. She states that the healing of the wound in the pylorus is brought about by the connective tissue of the serous and submucous coats of the stomach. The unstriped muscle cells of the cut muscle layers take no active part in the healing process. The raw, cut muscle edges and the exposed layer of submucosa which protrudes into the gap between them become covered by a thin layer of delicate granulation tissue, which, by the ninth day, has become cellular fibrous connective tissue. By the contraction of this layer of fibrous connective tissue, and the relaxation of the unstriped muscle, the edges of the wound are gradually brought into contact and the pylorus relaxes. The wound is completely healed in from nine to thirteen days, although the site of operation still shows a very evident depression. In twenty-five days this depression has become gradually less, and in six weeks only a delicate scar remains. Within two weeks the pylorus feels softer than it did at the time of the operation, and in twenty-five days the stomach is normal in size, and the pylorus but slightly firmer than normal. The Fredet-Rammstedt operation cures the pyloric lesion.

Those who advocate medical treatment agree that after the cessation of vomiting and improvement in the other symptoms, peristalsis may persist for weeks or months and that the tumor may be palpable for a number of months. Levy and Sauer refer to this point especially and Holt states that the typical tumor may last as long as six months. There are some old reports which seem to indicate that the symptoms of the pyloric obstruction may recur later in life. I have not seen any reports of autopsies performed years after what was supposed to be recovery from hypertrophic pyloric stenosis under medical treatment to show what the condition of the pylorus is after such supposed recovery. On the other hand, Wollstein's observations show conclusively that recovery is complete after the Rammstedt operation and that recurrence is impossible.

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Book Reviews.

Premature and Congenitally Diseased Infants. By Julius H. Hess, M.D., Professor and Head of the Division of Pediatrics, University of Illinois College of Medicine; Chief of Pediatric Staff, Cook County Hospital; Attending Pediatrician to Cook County, Michael Reese and Englewood Hospitals; Consulting Pediatrician, Municipal Contagious Hospital and Winfield Tuberculosis Sanitarium, Chicago; Member of Advisory Board Children's Bureau, Department of Labor, Washington, D. C. Illustrated with 189 Engravings. Lea & Febiger, Philadelphia and New York, 1922. Price $5.50.

Dr. Hess aptly dedicates this new volume to the most helpless of the human race, the infant born prematurely, particularly needful of aid in its struggle for existence.

All the important considerations of prematurity are carefully dealt with and show evidence of a deep study of this subject. The term "premature" refers precisely to those infants born before the end of the fortieth week of pregnancy, although in common usage it refers only

to those who have undergone a gestation period of two hundred and sixty days or less. The causes of prematurity and the physiology of the premature infant are exhaustively considered, with many references and voluminous statistics; the author has done excellent work in determining the ages of prematures by demonstrating the centres of ossification in variously developed fetuses. This section contains numerous exceedingly well made and instructive roentgenograms.

In the chapter on Pathological Findings in Prematures the author states that premature birth should be considered a traumatic process, in which the characteristic pathological processes are most frequently noted in three groups of organs, for which there appears to be a predilection:

1. The skull with the brain and its membranes, inclusive of the spinal cord.
2. The lungs.
3. The gastro-intestinal canal.

Part II embraces nursing and feeding care. The chapter on the wet nurse is very similar to that in "Principles and Practice of Infant Feeding" by the same author. Prematures are divided into two groups, those able to nurse at the breast and those too weak to nurse at the breast. The important considerations in the care of these infants are maintenance of the body heat, beginning at birth, careful individual handling, with prevention of infection, and breast milk. Considerable space is given to the artificial feeding of prematures, when this is unavoidable, the importance of chymogenized (rennet) milk being emphasized. As is usual in publications dealing with infant feeding there is some tendency to overcomplicate this procedure. The feeding of orange juice as an antiscorbutic is commenced at three weeks, and cod liver oil for its antirachitic qualities at four weeks, regardless of the type of feeding.

An interesting and partly historical chapter is devoted to incubators; this chapter also contains certain rules which really formulate the essence of premature care:

"All contact with infected cases and attendants must be avoided.

"All visitors are best excluded.

"The conservation of heat must be begun immediately after birth.

"The infant must be properly dressed; its head as well as its body should be protected.

"The body temperature of the infant should not be allowed to go lower than 97° F. nor above 98.6° F. (We would prefer to see 99° F. as a minimum). Daily fluctuations greater than 1.5° F. are dangerous.

"The general care and feeding should receive the most careful attention.

"Above all else all care administered to the premature should tend to individualization."

Part III deals with the general diseases, subdivided on an anatomical basis. The chapter on Syphilis, while short, seems to summarize the important facts. X-ray is stressed as one of the most useful means of diagnosis, with a warning as to the confusion that may result from the presence of rickets under treatment.

Part IV takes up the important subject of prognosis. The most important prenatal influences on this are: (1) The absolute age; (2) the physiological development and absence of constitutional anomalies; (3) transmitted parental infections; (4) the presence of malformations. With the premature as with the full term child the breast fed infant raised among good home surroundings has a lower mortality than the same in institutions, and the artificially fed has a greater mortality than the breast fed.

One will find this book carefully and intelligently written, with due regard to the practical application of its theories, and replete with illustrations, statistics, and case reports.

Diseases of the Nose, Ear, and Throat. By WENDELL CHRISTOPHER PHILLIPS. Philadelphia: F. A. Davis Co. 881 pages. Price $8.00 net.

Investigation and research have increased our knowledge of the ear and of the nose and throat to such an enormous extent that it is almost impossible to find a text book which can treat of all in a satisfactory manner.

Dr. Phillips has succeeded admirably in the sixth edition of his work entitled, "Diseases of the Ear, Nose, and Throat," which appeared recently. He has not abbreviated the important subject of Physiology of Hearing and has devoted a very important chapter to the general etiology of ear diseases, the importance of which must necessarily be appreciated more and more by the specialist.

The illustrations are excellent and the addition of a number of plates shows the value of the x-ray in infections of the mastoid. He discusses at length the otitic brain abscess and assigns a very full chapter to the complications of chronic inflammation of the middle ear, viz., labyrinthitis. The cuts indicating the tests for infections of the semi-circular canals are excellent.

In the chapter on the Nose and Throat, there are many splendid plates, especially those taken to illustrate the diseases of the accessory sinuses and also those showing the recently developed technique of suspension laryngoscopy.

At the end is appended a formulary as used in the Manhattan Eye and Ear Hospital. A formulary of this kind is very useful to the student beginning practice in obtaining a knowledge of drugs used by the best authorities. It is an excellent work; not too full for the medical student, yet sufficiently complete for the specialist.

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COMBINED MEETING OF THE MIDDLESEX SOUTH, NORFOLK, AND SUFFOLK DISTRICTS AT THE BOSTON MEDICAL LIBRARY, MARCH 14.

Previous to the business meeting, Dr. Stone urged the members of Suffolk District to attend the meeting on June 20, 1923, in California. The California members of the A. M. A. are extremely anxious and are extremely cordial in their request that all of the other fellows go out there. There are many things besides the meeting which will prove to be of great interest to all who go in June. Dr. Stone also called attention to the new publication of *Hygeia*, which is to be issued on the 20th of this month. *Hygeia* will be sold at the introductory rate of $1.00. This is a new publication on scientific medicines, which everyone should have. Dr. Shattuck read the Annual Report of the Committee on Public Health of the Suffolk District Medical Society. Dr. Stone introduced a motion that this Committee be reappointed. The vote was passed that the Committee be reappointed as Advisory Committee to the Health Commissioner of Public Health of Boston.

THE MILK QUESTION.

Dr. Arthur W. Gilbert, Commissioner of Agriculture, the first speaker on the subject of "Milk," was introduced. Dr. Gilbert spoke from the standpoint of the farmer on milk production, saying that we all use some milk, and few of us too much, so therefore it was a vital question. During the war milk cost more per quart than it does at the present time. The cost of feed, etc., was high. Milk commissions were appointed and did much effective work by going around the various farms and in a helpful manner suggesting certain things be done, thus reducing the cost of milk production, an action which takes in the care of the animals, feeding, employees, etc.; the price of distribution also has to be figured in. The commissioners did their work so effectively that they are continuing this work. The average number of cows on a farm which produces our milk supply is only five; that is, we are concerned with small farms. Of course the number varies from one to perhaps two hundred and fifty, or perhaps in one or two dairies the number reaches three hundred cows. There must be a considerable number of dairies with less, in order to have the average number five. In the production of milk it is impossible, on a small farm with five or six cows, to expect the highest type of scientific conditions. Business is carried on on so small a scale that it would be a waste. It would be profitable, however, if there were fifty cows, to have trained men in charge, and carry on production in the modern business manner. When the business is carried on in a small way and the equipment is not modern, the milk coming to the public is not perhaps as good. The production of milk is now carried on over all parts of New England, the supply of Boston coming from a greater distance. It was formerly a local supply, brought in by teams, but not in car-loads. A lot depends on the kind of cow. Holsteins, for instance, give less milk than do Jerseys or Guernseys. We are anxious to obtain the best milk possible; therefore we go as far away as Vermont—150 to 200 miles from Boston—to buy good milk. Then again, there are difficulties and serious trouble as a result of the milk having to come such a distance. Using 1913 as a basis, the milk has increased in price 140 per cent. At the present time the average cost of milk is 8½ cents a quart. We are progressing, however; the standard of milk is rising; the number of cows is increasing, though slowly. However, Massachusetts has fewer cows than in 1890 and 1880, but in the last two or three years it has been noticeable that it was slowly and steadily climbing toward and past those figures of 1890. Agriculture is coming back. The railroad freight rates cost more for food and milk. The number of dairy cows in Massachusetts at the present time is 8,900 plus that number of last year. Everything is on the increase, so it seems.

Dr. Gilbert paid tribute to the inspectors by saying that they were fine men, going around inconspicuously, pointing out something here and there to be done, and yet being respected by those with whom they come in contact. The Boston milk inspectors are very fine men, too, and are getting results by tactfulness. In regard to the New England Dairy and Food Council: Its work has been in the last two or three years in schools. In 1921 it gave 1054 talks in schools in Greater Boston, and, in 1922, for ten months it gave 862 talks in the schools. The man at the head of this work is Professor Lockwood of Amherst. In 1921 there were 188 schools serving milk at recess, and in 1922 this was increased to 1461. Charts and posters have been distributed in the hope of making people realize the value of milk as a food. "Milk Fairies," a little play in which children personified the different parts of milk—fats, solids, vitamins, water, dirt—has been presented to almost all of the school children in Boston. Milk demand has increased from fifteen to twenty per cent. in the last few years. Dr. Gilbert thinks that with the help of doctors, the milk production will increase greatly, for more and more people are being interested in its great food value.

Dr. E. A. Crossman, of the United States Bureau of Animal Industry, was the next speaker of the evening, his subject being "The Situation Regarding Tuberculosis Among Cattle." Dr. Crossman said that in 1917 the government took hold to rid the country of this disease, except in the District of Columbia. About ten years ago Congress demanded that the District of Columbia be cleaned up. All the animals were tested and all animals that were tuberculous were done away with. At the present time this is a clean district. When the meat inspection laws of 1906 went into effect it was found that at the end of the test about 1 per cent. of the hogs slaughtered were infected with tuberculosis. Until 1917, 40,000 hogs out of 4,000,000 were infected, which was a tremendous loss. Much of this loss was thought to be the result of careless packers, but it really goes back to the feeders. Because of the great losses among pure-bred cattle it brought a number of people to Washington in 1917, who demanded of Congress that something be done to control the disease. Work was started and, finally, eighteen states were equipped to fight tuberculosis; and again, in 1921, when the Legislature met, every state in the Union, with Alaska and Hawaii, was included in the eradication of tuberculosis in cattle. A farmer comes to the Bureau for aid in the State and he turns his farm over for inspection. The animals are tested and those badly infected are slaughtered; others are put in quarantine. They test the animals annually or semi-annually. The government appropriates large sums of money in the eradication of tuberculosis in cattle. Most of the infection in hogs comes directly or indirectly from cattle. A farmer in Iowa consented to have his cattle tested; 30 per cent. of his herd reacted, so that the eradication of tuberculosis in hogs is believed to be able to take care of itself. Out of 300 counties in the United States there are over 4,000 small areas, towns and cities that have been cleaned entirely. Dr. Crossman said that they believed their work to be a success, for at the present time the Bureau has over 70,000 requests to have the test applied. In many cases it is a lack of appreciation when taking into consideration that 70,000 out of over a million have been heard from. Massachusetts was the last State in the Union to come in on this plan. In August, 1921, a new bill went into effect in regard to helping the farmers support the loss. A premium is not put on diseased animals, nor does the State pay any full loss to encourage tuberculosis. The farmer is expected to stand the loss for the most part. A farmer can receive as much as $25.00 for a grade cow; in addition to this something for salvage. The work is getting on finely, but if it is going to grow fast everyone must coöperate and demand that the work be done, and it must be done through public sentiment, for without public sentiment there cannot be success. No one ought to be more interested in tuberculosis eradication than the officers and members of the American Medical Association. This Bureau is going to work until bovine tuberculosis is eradicated from this country.

Dr. Richard Smith spoke about what the certification and pasteurization of milk does and does not. Dr. Smith said that certified milk was an attempt to control the milk supply by supervision of the production of milk, and the methods of production from the time the farmer handles it until it reaches the consumer. Pasteurized milk is natural cow's milk, not over 70 hours old—30 minutes to 140° to 145° F. To Dr. Smith there seemed to be no great difference between certified and pasteurized milk. Certification tries to control the production and pasteurization exercises no control. Certified milk is cleaner than pasteurized milk, but still pasteurized milk is clean, for progress has been made in the last few years. Pasteurized milk is made safe by the destruction of bacteria, and the toxic products in milk have been taken out. People know that 140° for twenty minutes will kill most bacteria. Pasteurized milk does not sour quickly. Certified milk costs a good deal more than pasteurized milk, but, however, pasteurized milk is within the reach of average people. In general, Dr. Smith approved of pasteurized milk, saying that, taking all into consideration, it was pure, clean milk.

Dr. S. B. Wolbach, the last speaker before the discussion, had for his subject bovine tuberculosis in man. Dr. Wolbach has made a study of bovine tuberculosis. He said that the first of this work was started in 1905, when three papers

were presented, among them that of Theobald Smith. Out of some twenty-odd cultures which were worked upon, four were found to be of bovine origin. The next work was done on twenty cultures from tuberculous adenitis, one half of which were of bovine origin.

Cervical Adenitis.—Under five years of age, 61 per cent. have proved to be of bovine origin; five to sixteen years of age, 38 per cent. have proved to be of bovine origin; over these ages, 3 per cent. have proved to be of bovine origin.

Abdominal.—Under five years of age, 58 per cent. have proved to be of bovine origin; five to sixteen years, 53 per cent. have proved to be of bovine origin; over these ages, 20 per cent. have proved to be of bovine origin.

About ten years ago lung cases were studied which showed bovine at the apex of the lung:

Alimentary.—Under five years of age, 47 per cent. proved to be of bovine origin; five to sixteen years, 57 per cent. proved to be of bovine origin.

Bones and Joints.—Under five years of age, 6.8 per cent. proved to be of bovine origin; five to sixteen years, 10.20 per cent. proved to be of bovine origin.

Pulmonary.—Under five years of age, 2.8 per cent. proved to be of bovine origin; five to sixteen years, 12.2 per cent. proved to be of bovine origin.

Wang, in Edinburgh, began with 88 cases of his own and gradually increased that number to 2,527 cases, and found with bovine, under five years, 32.4 per cent.; five to sixteen years, 28.9 per cent.; over sixteen, 3 per cent.

In France, where he did his work, he found that in 100 cases 75 per cent. under five years of age proved to be of bovine origin; 10 per cent., from five to sixteen; and 8 per cent., over sixteen.

In Great Britain: 32 per cent., under five years of age, proved to be of bovine origin; 24 per cent., from five to sixteen, and 7 per cent., over sixteen. In Griffith's 1,068 cases in England he found 35 per cent., under five years of age, to be of bovine origin; 48 per cent. human; from five to sixteen, 28 per cent. bovine and 46 per cent. human; over sixteen years, 17½ per cent. bovine, and 20 were bone and joint tuberculosis. In one instance thirty cases were used and, after cultures were taken, it was found that ten had bovine; of these four were genuine tuberculosis, and one genito-urinary tuberculosis, all under five years of age. The others were largely bone and cervical. Bovine infection found in the presence of tuberculosis in children under sixteen years of age is from 14 to 20 per cent.

DISCUSSION.

Dr. Carey spoke about cleanliness. He said that the demand for clean milk could not be over-emphasized. He spoke about the advantages of requiring each employee in a dairy to be thoroughly examined by a physician. Dr. Carey also made mention of certified and pasteurized milk, saying that certified milk was preferable. Again he referred to the cleanliness of the small dairies, keeping the farmers interested to be clean, keeping their farms clean, and also the personnel. The result would tend to give better milk to the public.

Dr. Donnelly came from New York to speak about milk, as he is specializing in children and nutrition of same. He was highly in favor of certified milk to be used in the feeding of infants. Certified milk cost about twenty-eight cents a quart, and almost anyone would pay that for an infant. He said there were five grades of milk, namely: 1, breast; 2, certified; 3, Grade A; 4, Grade B; 5, loose. He said that the pregnant mother should be given good, pure milk to give her the proper vitamins.

Dr. Churchill, of Milton, a pediatrician, spoke on the findings of tuberculosis among school children. He said that 20 per cent. of the school children were below par. Also that there should be special reference made to physical examinations of school children, especially of the chest.

Dr. Otis spoke briefly on tuberculosis and the milk situation. His prominent remark was that there should be a certain amount of tubercle bacilli in milk.

Dr. Morse said that, in comparing certified and pasteurized milk, it depends on the human element; both are satisfactory if prepared satisfactorily. He thinks feeding babies on both kinds of milk is good. The improvement in the milk supply all over the country has been due more to certified milk than to any one thing; that the standard of milk has been raised because of certified milk.

Dr. Crossman again made a few remarks, and Dr. Hill had a recommendation which was read and accepted by those present.

In all the discussion the plea was manifested for better, purer and clean milk. If people cannot afford to buy the certified milk, pasteurized milk should be bought in large quantities.

At the close of the discussion the following resolutions were submitted and unanimously approved:

Recognizing the great value and importance of dairy products and the need of maintaining their purity in the interest of the public health, we regard it as essential

(1) That all milk which is to be consumed raw should be certified.

(2) That all milk should be produced under sanitary conditions even though it is to be pasteurized.

(3) That state or local authorities should supervise the methods of pasteurization.

(4) That the same safeguards are necessary in regard to the production of butter and cheese as apply to milk, cream, and ice cream.

(5) That the greater use of pure milk should be encouraged.

REPORT READ BY DR. ROBERT W. LOVETT AT THE MEETING IN CHICAGO, MARCH 5, 6 AND 7, 1923, RELATING TO THE PROBLEMS OF EDUCATION OF NURSES AND NURSING SERVICE.

THE report begins with a statement of the field defined in the address of the Speaker of the House of Delegates as published in the *Journal of the American Medical Association*, Vol. 78, page 1638, which relates to the discussion and criticism of trained nurses, nursing service, training schools, curricula of training schools for nurses and the nurse in health and industrial work, together with the recommendation that a special committee be appointed with authority to make a thorough survey and study of the problems, and submit its report at the next annual meeting.

The committee was appointed in November, 1922, consisting of Dr. Richard O. Beard of Minneapolis, Dr. Lawrence R. De Buys of New Orleans, Dr. Austin Flint of New York, Dr. Thomas McCrae of Philadelphia, Dr. Winford Smith of Baltimore, Dr. George B. Somers of San Francisco, and Dr. Robert W. Lovett of Boston, Chairman.

The report sets forth that although the problems are complex, they should be faced. The attention of the committee was first given to nursing education, and the phenomenal growth of training schools from 15, in 1880, with 323 pupils, to 1755 in 1920, with 55,000 pupils, was used as an illustration.

Comparison of the number of nurses and medical students shows that the number of nurses has increased during the period 1880 to 1920 170 times, whereas in the same period medical students increased from 11,800 to 14,000. This increase in training schools and pupils seemed to the committee to be too rapid for the development of orderly educational schemes and methods for training nurses. The solution, it is claimed, rests with co-ordinate effort on the part of the nursing and medical professions, because, although the nurse during training is particularly under the instruction of the training school, after graduation her association with and obligation to the doctor and patient would logically compel an understanding of these relations. Ultimately, the obligations of the nursing and medical professions are to the patients.

At present, nursing education is not standardized, systematic, or uniform in the requirements for entrance, length of courses and methods of teaching because of the different conditions in smaller communities as compared with urban centers.

The committee does not feel that legislation will be the solution of the problems, for the diversity of state requirements is set forth in the table following:

In the 48 states the following conditions existed in June, 1922:

ENTRANCE REQUIREMENTS.

Graduation from Grammar School (8th grade)	5 States
One year of High School	20 "
Two years of High School	7 "
Four years of High School	6 "
"Determined by the Board"	4 "
"Good Common School Education"	2 "
No legislation on the subject	4 "

LENGTH OF COURSE IN THE TRAINING SCHOOL.

Two years	19 States
Two and a half years	1 State
Three years	22 States
Not prescribed	4 "
No legislation	2 "

The defects in the training school of today appear to be:

1. The course on the whole is unsystematized, unstandardized, and far from uniform in the different schools.

2. There is in general thought to be too little systematic instruction in practical work in most courses, and too much theory; and whether or not this be true, there is certainly a lack of correlation between the two elements.

3. Many of the teachers in these schools are poorly equipped.

4. There is a waste of the time of pupil nurses in uneducational routine work.

5. Many schools are connected with hospitals where clinical facilities are utterly inadequate.

A criticism is offered of the instruction given by some doctors connected with some schools, for it is the opinion of the committee that although there are good teachers, others will be more or less indifferent or even bored. It is claimed that with some physicians the lectures cover those subjects in which they are most interested without correlation with their associates or the plans of the school, and that among some of the teachers who are nurses there is lack of intellectual and pedagogic fitness. This latter fault can be obviated only by insisting on the proper education of teachers, preferably in the university schools of nursing.

The very common economic requirement in many schools, of having nurses assigned to work which is of no value to them, but is desirable from the school's necessities, is emphasized. Illustrations taken from the routine of some schools are used to support this contention.

There is in these conditions direct conflict between the most efficient training of nurses and the needs of many hospitals for comparatively inexpensive nursing service.

The report brings out the fact that very many hospitals do not have an adequate number of patients for clinical demonstrations and experience. Under the subject "a" the report sets forth that the conclusions of the Winslow Com-

mittee, in which it was recommended that the standard course should not exceed 28 months, is endorsed because it is believed that changes in the amount of work required of the nurse would relieve her of wearing toil, and give ample time for all necessary study and training needful in developing the bedside nurse, and that in order to provide the proper mental development of the pupils, a preliminary education equivalent to a four years' high school course is necessary. This requirement is in force only in six states, so that the demand for this change will have to be adopted gradually.

Under "b" it is recommended that supplementary training should be provided for those nurses who are ambitious to attain greater excellence, and become eligible for important positions such as specialization, teaching and the duties of administration.

Under "c" careful consideration has been given to the problem of subsidiary nursing service variously styled as attendants, practical nurses and nurses' aids. It is reported that out of about 300,000 nurses in this country today there are only about 150,000 who are registered trained nurses. The 150,000 subsidiary nurses demonstrate the usefulness of this class and warrant recognition, but although there are inherent difficulties attending the establishing of fair relations affecting both the nursing profession and the public, efforts should be made to correct abuses and give these subsidiary nurses standing.

Although the desirability, and perhaps necessity of having these second-class nurses is recognized, this committee, like all previous ones engaged in a study of all the problems involved, has not presented a concrete plan for the education and control of the subsidiary nurses. The needs of the people are fully recognized, and the problems of training schools, together with standardization of curricula, are fully set forth, but beyond that the committee evidently is convinced that further study must be given to the whole subject by a committee to be arranged for by the American Medical Association in conjunction with the National League of Nursing Education, which should contain in its membership physicians, nurses, and an educator.

The report, as a whole, presents the problems in definite form, and if its recommendation for the creation and composition of a committee is adopted, we may confidently expect a solution of the major difficulties involved in the education of nurses, and the practice of the nursing profession.

The report will be presented at the coming meeting of the A. M. A., and the action of the Association will be looked forward to with interest.

THE CONTINUED CAMPAIGN AGAINST VACCINATION.

What Say You About Vaccination?

If the subject interests you, please answer the questions on the attached card, and remail to us as soon as possible.

Medical Liberty League, Inc.,
755 Boylston Street, Boston.

1. Are you opposed to the Law excluding from the schools children who are not vaccinated?
   Answer—
2. Do you believe vaccination protects against smallpox?
   Answer—
3. When were you last vaccinated?
   Answer—
4. Have you known anyone who contracted smallpox after vaccination?
   Answer—
5. Do you know of any instance of injury or death attributed to vaccination?
   Answer—

Name .....
Address .....

The above printed return postal card, emanating from the Medical Liberty League, Inc., deserves scant mention except as an indication of the measures adopted by our opponents which must be met if the truth concerning medical procedures and the conservation of public health is to be fixed in the minds of the public.

If questions 4 and 5 receive many affirmative answers, we trust that the League will employ its organization and the means at its disposal to sift the evidence presented, and corroborate it before it is used for further propaganda.

Were it not for the experience of centuries, which has taught us the gullibility and lack of reasoning power of a certain proportion of our populations, we would stand aghast at the influences which make so many turn from the clear light of laboriously wrought and conscientiously expounded truths, and follow instead the false but widely advertised logic of the misguided and the prejudiced.

The same type of mind which leaps in response to the illusions of an Abrams, seeks a mysterious and magic cure from a Coué, or finds health and surcease in the stroke of a metallic tractor, will find itself very receptive to the purveyor of gold bricks who promises great returns without the payment of a fair price.

The price of a national immunity to smallpox is universal vaccination, compulsory if necessary. The price has been set by those who know through years of their own experience and that of their predecessors that it is a fair one. The price of immunity to diphtheria is a fair price; a price determined by experts. You may save yourself the price of insurance, and your house

may not burn, but if it does burn the loss may be total. But do not believe those who say that insurance of health or of goods is a false procedure.

THE DIFFERENCE BETWEEN A BOARD AND A COURT.

THE difference between a Board and a Court is plainly visualized by the recent decision of the Supreme Judicial Court overturning a decision of the Industrial Accident Board in the case of Bridget Ginley *vs.* American Writing Paper Company. The Industrial Accident Board decided, in effect, that where an injured employee had once shown that she had sustained injuries which left her with a permanent partial disability, the burden thereafter was upon the insurer to show that there was work available to the employee which she could do before it would be entitled to an order reducing or terminating compensation.

In other words, the Industrial Accident Board, out of its experience of the past eleven years in dealing with cases under the Workmen's Compensation Act, did not believe that an employee who had sustained permanently disabling injuries should be obliged every time an insurance company asked for a hearing to sustain the burden of again proving her right to compensation which the law intended her to have during her incapacity.

The Board did not believe that she should be compelled at each separate hearing to bring in her witnesses, including medical witnesses, to show what her present condition as related to the injury was, and bear the expense of doing so, as would necessarily have to be done if the burden of continuing to prove her case was upon her.

The Court, in overruling the Board, said:

"The burden of showing the measure of her incapacity had not shifted, but continued to rest on the claimant, and the ruling of the Industrial Accident Board was wrong. We have not overlooked the fact that in making the ruling the Board followed Proctor & Sons *v.* Robinson, 1 K. B. 1004" (an English case), in which it was held under somewhat similar circumstances that the employers "must first show what particular kind of light work the workman is able to perform, and must offer evidence that he is able to get it."

As a practical matter, it would seem to us that where an employee has once proved her case, that is, has shown that she has a definite, permanent impairment of working function, she should not be compelled every time an insurance company desires a hearing to re-prove her case. That is, as we understand it, the attitude of the Industrial Accident Board, and has been its attitude for many years. We would favor an amendment to the law providing in effect that the burden of proof shall be upon the party requesting a hearing under the Workmen's Compensation Act, except that it shall be upon the insurer in all cases in which the parties have reached an agreement in regard to compensation or where a hearing is requested following a prior decision in favor of the employee.

Such an amendment would place the burden of proof where it belongs, and would have the support of the medical profession generally. The exercise of greater discretion by insurance companies in appealing cases of this character to the Courts will have a deterring effect upon exclusive state fund propaganda.

CASE 12078

Bridget Ginley	Employee
American Writing Paper Company	Employer
Aetna Life Insurance Company	Insurer

DECREE OF SUPREME JUDICIAL COURT.

BRALEY, J. The claimant, whose weekly wages were $16, received an injury arising out of and in the course of her employment on May 29, 1919, for which compensation was paid to the date of the hearing under proceedings begun by the insurer to determine whether the disability arising from her injury had ceased. The board member of conflicting evidence was warranted in finding that her inability to follow her usual employment resulted from, and was causally connected with her injury, and ordered the payments continued subject to the provisions of the statute. The insurer having filed a claim for review, a hearing was had before the Industrial Accident Board on the report of the board member, which contained all the material evidence. It is undisputed that the employee had sufficiently recovered to be able "to do certain forms of light work if it was available." But no evidence had been introduced before the board member that she had sought such employment but had been unable to obtain it. The board, however, ruled that the burden of proof was "on the insurer to show that such work is available to the employee." The correctness of this ruling is the only question presented for our decision. If the claimant while working for the company under a contract at common law had been unlawfully discharged, and had brought suit claiming damages on the ground that she had been unable to obtain regular work, the burden of proof would have rested on her. *Lopes v. Connolly*, 210 Mass. 487, 494. It was decided in *Pigeon's Case*, 216 Mass. 51, that the findings of the Industrial Accident Board stand on the same footing as the findings of a judge sitting without a jury, and are not to be set aside if there was any evidence upon which they could have been made. We discover no substantial difference in this respect as to the rules of evidence whether the trial is before a judge or before the Board. *Diaz's Case*, 217 Mass. 36; *Savage's Case*, 222 Mass. 205; *Smith v. Hill*, 232 Mass. 188. It has uniformly been held by this court that the burden of proof remains throughout the trial on the plaintiff to establish his case on all the evidence where liability is denied, or the amount to be recovered is in issue. *Carroll v. Boston Elevated Railway*, 200 Mass. 527, 536; *Bigelow Carpet Co. v. Wiggin*, 209 Mass. 542. The statute, while conferring the right, has made recovery of compensation dependent upon compliance with precedent conditions by the employee before his claim can be considered. G. L., c. 152, ss. 41, 42, 43, 44. It is plain that, if not conceded by the insurer evidence must be introduced which satisfies the statutory requirements and warrants an award. *Spoatski's Case*, 220 Mass. 526; *Doherty's Case*, 222 Mass.

98; *Newman's Case*, 222 Mass. 563; *Fierro's Case*, 223 Mass. 378; *Dube's Case*, 226 Mass. 591; *Lacione's Case*, 227 Mass. 269; *McCarthy's Case*, 231 Mass. 259; *Jakulis's Case*, 238 Mass. 398. If the question had been in dispute, the claimant would have been obliged to offer evidence as to her average weekly wages. *Gorski's Case*, 227 Mass. 456. And the amount to be awarded depends on whether the incapacity is total or partial. G. L., c. 152, ss. 34, 35. It is common knowledge that a condition which, as in the case at bar, originally was one of total disability may by improvement change to partial disability, and if at the request of the insurer and after a hearing it appears that total disability has ceased the amount of compensation is to be accordingly reduced. G. L., c. 152, ss. 35, 45. But at such hearing the claim of the employee is still for compensation as it was in the beginning. The burden of showing the measure of her incapacity had not shifted, but continued to rest on the claimant, and the ruling of the Industrial Accident Board was wrong. We have not overlooked the fact that in making the ruling the Board followed *Proctor & Sons v. Robinson* (1911), 1 K. B. 1004. It was there held that, where an injured employee was able to engage in "some light work," but no evidence was offered of any effort by him to obtain employment, the employers "must first show what particular kind of light work the workman is able to perform, and must offer evidence that he is able to get it, either by proving that that have offered him that particular kind of light work, or by giving some evidence that there is a chance of his obtaining that particular kind of work in the district if he applies for it." But without commenting on that case or later cases cited and reviewed in the brief of counsel for insurer which it is argued have modified or impaired the authority of *Proctor & Sons v. Robinson*, it is enough to say that, not being in accordance with our system of procedure, or fundamental interpretation of the statute for reasons previously stated, we decline to follow it. The decree must be reversed, and the case remanded to the Industrial Accident Board for further proceedings not inconsistent with this opinion.

Ordered accordingly.

Miscellany.

A NUTRITION INSTITUTE AT ROCHESTER, NEW YORK.

A Nutrition Institute was held from January 29 to February 10 at Rochester, New York. The Rochester meeting was the third to be held in that city and brought together sixty-three workers from various sections of New York State and from Washington and other cities. Sixty hours of lectures and class work were given, including ten demonstration periods. In addition to reports of the work of Dr. W. R. Emerson and his associates, addresses were given by Professor E. V. McCollum of Johns Hopkins University and the executives of several county tuberculosis associations which are carrying on nutrition classes. There was especial interest in the report made by Dr. Herben, a member of the first institute held in Rochester, who has organized the nutrition work of the New York City Tuberculosis Clinics. The department will reach 18,000 children. Rochester has at all times 1500 children in public and parochial school nutrition classes who are averaging 350 per cent. of the gain in weight expected of normal children of these ages. As fast as children are brought up to normal condition their places are filled from a long waiting list. Dr. Albert D. Kaiser gave a report of the nutritional status of 5000 children operated on about a year ago for the removal of diseased adenoids and tonsils. He also stated that on investigation he had found that 70 per cent. of the nutrition class "graduates" held their acquired weight. A report was made of the introduction of the nutrition program among the employees of the Eastman Kodak Company.

THE SPRINGFIELD PUBLIC HEALTH CONFERENCE.

Sixteen Massachusetts agencies active in the promotion of health and health education have joined forces for a Massachusetts Public Health Conference to be held in Springfield on Thursday, Friday and Saturday, April 26 to 28, according to an announcement by Dr. Eugene R. Kelley, State Commissioner of Public Health.

Dr. Kelley is chairman of the general committee in charge of the Conference; Robert V. Spencer, of the Massachusetts Tuberculosis League, is secretary, and there are sixteen vice-chairmen representing the participating organizations, these officers forming the executive committee.

The Conference will, it is believed, be the most important gathering of health workers that has been held in the State, and may become a permanent annual event. The program has not been completed in detail, but it will include a great general session with speakers of national reputation, sectional meetings of the organizations taking part, a discussion of rural health work, and consideration of the all-important subject of school health work. The meetings will be open to the public.

The Conference is called in Springfield on the cordial invitation of the Springfield Chamber of Commerce, which assures ample hall space for the many sectional meetings and the general sessions in the municipal group. Excellent accommodations can also be provided for the delegates from all parts of the State. Furthermore, the Connecticut Valley and the western part of the State have important health agencies, institutions and developments which cannot fail to be of great interest to all whose work lies in the line of bettering the health of the people.

The committee in Springfield includes Dr. Harold E. Miner, who has charge of local arrangements, and Frederic Edwards, executive secretary of the Hampden County Tuberculosis and Public Health Association, who has charge of exhibits.

The participating organizations are:

Boston Association for the Prevention and Relief of Heart Disease, Massachusetts Association of Boards of Health, Massachusetts Association of Directors of Public Health Nursing Organizations, Massachusetts Association for Occupational Therapy, Massachusetts Committee of The American Society for the Control of Cancer, Massachusetts Dental Hygiene Council, Massachusetts Dental Society, Massachusetts Society for Mental Hygiene, Massachusetts Society for Social Hygiene, Massachusetts State Department of Public Health, Massachusetts State Nurses' Association, Massachusetts Parent-Teacher Association, Massachusetts Tuberculosis League, New England Division, American Red Cross, Public Health Committee of the Massachusetts Medical Society, Public Health Committee of the Massachusetts State Federation of Women's Clubs.

News Items.

HARVARD MEDICAL SOCIETY.—A meeting of the Society was held in the Peter Bent Brigham Hospital Amphitheatre, Tuesday evening, March 27. The program consisted of a demonstration of cases, and a paper, "The Odyssey of Demokedes, the Krotoniate," by Dr. F. S. Meara, of New York.

MEDICAL MILK COMMISSION OF BROCKTON.—The Medical Milk Commission of Brockton has recently been incorporated, and elected the following officers: Dr. J. H. Lawrence, president, Dr. J. H. Drohan, vice-president; Dr. W. W. Fullerton, treasurer; Dr. W. E. Caswell, clerk; Dr. J. H. Lawrence, Dr. J. H. Averill, Dr. H. A. Chase, Dr. L. B. Packard, executive committee. The Maplewood Farm of the Producers' Dairy Company has been certified and the company is selling certified milk.

WEEK'S DEATH RATE IN BOSTON.—During the week ending March 24 the number of deaths reported was 262, against 267 last year, with a rate of 17.73. There were 37 deaths under one year of age, against 43 last year. The number of cases of principal reportable diseases were: Diphtheria, 70; scarlet fever, 104; measles, 111; whooping cough, 115; typhoid fever, 1; tuberculosis, 27. Included in the above were the following cases of non-residents: Diphtheria, 12; scarlet fever, 19; tuberculosis, 2. Total deaths from these diseases were: Diphtheria, 2; scarlet fever, 2; measles, 2; whooping cough, 5; tuberculosis, 17. Included in the above were the following cases of non-residents: Diphtheria, 1; scarlet fever, 1; tuberculosis, 2.

Obituary.

ORVILLE FORREST ROGERS.

1844-1923.

DR. ROGERS was a remarkable man, one of the ablest I have ever known. Of pure New England stock, his boyhood was passed in Tilton, then called Sanbornton Bridge, New Hampshire, exeept during a few years when the family moved to Grand Rapids, Michigan, then practically a frontier town. His father, Samuel Rogers, was a leading citizen of Tilton, a Democrat, and at first, at least, more inclined than most of his neighbors to sympathize with the South on the outbreak of the Civil War. Orville, however, early began to do his own thinking, and the attack on Fort Sumter led at once to a division of political opinion in the family. On the occasion of the celebration in the town of some Northern victory young Rogers floated a flag to the breeze from the roof of the house, nailing down the skylight and hiding the ladder so that the flag could not be readily removed. The town boasted one small cannon which was brought into use by both parties, Northern and Southern, in jubilation over successes on either side. The cannon disappeared, and in some mysterious way was thereafter always available for the celebration of a Northern victory, never to be found for a Southern.

It would have been just like Orville, young as he was, to enlist at once, and I suspect that he was only prevented from so doing by deferenee to his father's opinions. His early schooling was purely local. Active alike in both mind and body, when a lad he did a man's work in the hay field, and had energy to spare for his full share in such pranks as give more delight to boys than to their elders. For a time he taught school, an unruly school which had driven out several teachers in succession, and doubtless expected to serve him in the same way. He was innocent in countenance, quiet in manner, quick as a panther, strong, and skillful in the use of his strength. The scholars soon recognized his mastership. A selectman or other town dignitary remarked, "Young Rogers is a good teacher, but his discipline is severe."

At 19 he took up the study of medieine, with Dr. Lyford of Tilton as his preceptor, going the rounds with him, and attended a course of lectures at the Harvard Medical School. With this one year of professional training behind him he did not hesitate to apply for a medical commission in the army. The Government was then forming regiments of United States colored troops, of which there were finally 130 in the service. The Confederacy had threatened to hang any officer of a Negro regiment, and the positions were not over-applied for. Rogers reflected that they couldn't hang him until they

caught him, and was willing to run the chances. He was tipped off that the examiner was not averse to being entertained and that a crucial question with him was, "How do wounds heal?" The prompt answer, "By first intention," and the laying out of a large fraction of Rogers' meagre cash in refreshments passed him triumphantly. He was, in the fall of '64, assigned as Assistant-Surgeon to a regiment in the Army of the Potomac, and learned about life in dugouts and trenches in the Petersburg campaign, as well as many other things. One little incident may serve to show Rogers' keenness. The slackness of a surgeon had encouraged in the men all sorts of means to evade duty. The number of leg ulcers attracted his attention, as did the fact that the ulcers were perfectly round. He soon found that these were produced by fastening an old copper cent closely to the skin, and the chemical action thereby excited through the sweat did the rest. The way of the malingerer was found to be hard under Rogers. His regiment, being composed of Negroes, was one of the very first to enter Richmond. Soon after the close of the Civil War he and his regiment were sent to Texas, then in a condition to prompt General Sheridan, the Commander of our forces there, to remark that if he owned Texas and Hell he would rent the former and live in the latter. Here Rogers remained two years until the fall of Maximilian ended our military watch along the Rio Grande.

Rogers was just the man to profit by these years of real experience with men and things. His self-confidence was balanced by rare common sense and humor. His native resourcefulness was called into play by the necessity of getting results from such means as might be at hand. I would that space permitted a number of the stories of his Texan experiences, but permit myself all too briefly to relate one. Owing to the neglect of the Government, scurvy was ravaging the troops, and none of the recognized preventives or remedies were at hand. Somebody saw somewhere in print that the fresh juice of the century plant was an anti-scorbutic. Some miles from the camp this plant grew in plenitude. Army wagons brought it to camp, where the leaves were softened by putting them on hot stones, and the juice was squeezed out by an old cotton press enlisted in the service. The liquid was served out by the tin cupful twice a day to the men, with prompt effect.

As a story-teller he had few equals, and his varied life provided him with a plentiful store of actual experiences which he knew how to dress up effectively.

On leaving the army he spent a year in study with Dr. Buck of Manchester, and then a year at the College of Physicians and Surgeons in New York, where he took the M.D. degree in 1869. Then, with the late James H. Denny, he served for a year as Assistant-Physician at the Hartford Retreat, and was one of the pioneers in the more humane treatment of the insane and the limitation of restraint. For the next two years he was Assistant-Physician at the McLean Hospital for the Insane, and in 1872 started general practice in Dorchester, where the rest of his life was spent. As Physician to the Marcella Street Home he had large experience in what is now called Pediatrics. For 25 to 30 years he was a Trustee of the Danvers Insane Hospital. He and Dr. Page, the Superintendent, were long-time and intimate friends, worked hand in hand, and he rendered service which it would be hard to over-estimate. His ability, devotion, and high sense of duty won him the respect of all, and the affection of many, who came into contact with him. A militant honesty of thought and expression probably did something to limit his practice, and saved him some undesirable patients.

In 1877 he married Josephine Tucker of Dorchester. She died some 20 years ago. A son, Orville F., Jr., Harvard A.B. 1908, M.D. 1913, survives, and lives in New Haven, where he is Assistant-Director of Yale University Health.

Clarity and vigor of thought readily translated into action were his. No sham imposed upon him. Tall, lithe, with a carriage in which his military life lingered, thoughtful and yet spirited in face, true as steel, like the great painter he mixed his colors with brains.

Those who knew him best know what has passed out of the world. F. C. S.

RECENT DEATHS.

Dr. Jonas Hobart Vaughan, a former practitioner of Everett, Mass., and a Fellow of the Massachusetts Medical Society from 1897 to 1922, died at Marshfield, March 22, 1923, at the age of 68.

He was a native of Plattsburg, N. Y., and a graduate of the University of Vermont College of Medicine in 1880. Following the year 1912 he had lived in Florida, Henniker, N. H., and Dighton. He settled in Marshfield last fall.

Dr. Vaughan was one of the founders of the Whidden Memorial Hospital, and was active in the Y. M. C. A. in his younger days. He was a member of Palestine Lodge of Masons and Bethsaida Royal Arch Chapter of Everett, and Beauseant Commandery, K. T. of Malden. He is survived by his second wife, Mrs. Mary Knox Vaughan.

Dr. Thomas Conant, formerly of Gloucester, who died March 24, 1923, at his home in Roxbury, was born in East Bridgewater 81 years ago and attended the public schools there. At the outbreak of the Civil War he enlisted in Company C, Twenty-ninth Volunteers. He served throughout the war and rose to the rank of lieutenant. After discharge from the army he studied medicine at Georgetown University, District of Columbia, took an M.D. there in 1867 and from Harvard Medical School in 1868 and settled in Gloucester, where he practiced for more than 40 years.

While at Gloucester Dr. Conant was active in civic affairs and for 25 years was a member of the school committee. He was also chairman of the medical board of directors of the Addison Gilbert Hospital and had held office as president of the Cape Ann Scientific and Literary Association and was a trus-

tee of the Sawyer Free Library. He returned to Bridgewater in 1913, where he made his home with his son, the Rev. Harold F. Conant. Three years ago he moved to Boston.

Besides his widow, who was Mary Sargent of East Bridgewater, he is survived by three sons.

Correspondence

LONDON LETTER.

(From Our Own Correspondent.)

London, March 9, 1923.

The New Hospital for Mental Disease.—Dr. Maudsley was one of the best known alienists of this country, and he has left a lasting memorial of himself and his work in the form of a hospital founded and endowed by him for the study of early mental disease and its treatment outside of the asylum. This hospital was presented by him to the London County Council. Although the institution was formally opened quite recently, during the war, thanks largely to the wisdom of Sir Frederick Mott and Sir Alfred Keogh, then director-general of the British Royal Army Medical Service, good use was made of the Maudsley Hospital, especially with regard to the many so-called "shell-shock" cases. Now, in addition to the treatment of early mental disorder, provision has been made for observation of those cases which possess unusual scientific interest, for research work of all kinds, and for the study of psychological medicine, especially by qualified practitioners. Arrangements will also be made for clinical instruction and for regular courses of lectures. It is hoped that the hospital, which is modeled on the lines of the neurological and psychiatric clinics of Europe and America, will become one of the recognized schools of the University of London.

The buildings of the hospital stand on the high ground of Denmark Hill, a suburb of London on the south side of the Thames, and face King's College Hospital—itself erected only a few years ago. The situation is easily accessible from all parts of London. Outwardly, the buildings are pleasing, although, perhaps, more utilitarian than ornamental, while the interior arrangements are up to date in every detail.

The hospital consists of an out-patient department and 157 beds for in-patients. There are 13 private rooms for female patients who can afford to pay considerable fees for treatment, accommodation and care, and to these rooms dining-room, sitting-room and garden are attached. The six wards contain 24 beds each. The wards include separate rooms and dormitories, and three wards are provided for each sex. Every ward has its sitting-rooms and dining-rooms. In these wards classification is solely according to the nature of the symptoms. For treatment in these wards patients living in the administrative county of London are required to contribute according to means, as at the voluntary hospitals. Those living outside the London area cannot be received unless they are prepared to pay the full maintenance rate, at present £5 ($25) a week. The equipment is of the latest. An apparatus has been installed to take electric records of the emotion shown by any patient, and to avoid the constant use of drugs, provision has been made for treatment by soothing hot baths.

The total whole-time medical and nursing staff numbers 100. The medical superintendent, Dr. Edward Mapother, has associated with him four whole-time medical officers, including one woman, with the voluntary help of a considerable number of qualified medical men and women as clinical assistants. The association of the Maudsley Hospital with the pathological department of the London County Mental Hospitals, under the direction of Sir Frederick Mott, assures the application of the most modern laboratory methods of diagnosis and treatment. The services of consultant specialists are available to all classes of patients in regard to surgical, gynecological and obstetric conditions, as well as disorders of eye, ear, nose and throat. There is a staff of 12 male nurses and 50 female nurses. The nursing of male patients is almost entirely carried out by women.

It may be said that the Mental Hospitals Committee of the London County Council have between 18,000 and 19,000 cases of mental disorder in their care at the present time. It may also be pointed out that Dr. Maudsley had three main interests in life. These were, first, an attempt to deal at an early stage with certain types of mental disorder, thereby rendering them curable or preventing their further progress. Second, a keen desire to establish exact research into the causes of mental disorder; and third, a great anxiety to see the proper clinical instruction of students carried on. It is now recognized that some cases of mental disorder are by no means hopeless, but if taken in time, can be nipped in the bud, in the same way as physical disease can frequently be prevented from developing if properly treated in the early stages. In fact, some forms of mental disease can be traced to a physical cause. Dr. White Robertson has propounded the theory that dementia precox is mainly, if not entirely due, to chronic intestinal stasis, which brings about a toxemia of the system and prejudicially affects the mental powers. Sir Arbuthnot Lane and other men eminent in surgery and medicine hold similar views. Mental hygiene is a branch of medicine rapidly coming to the fore and rightly so. The establishment of the Maudsley Hospital is the first well organized and scientific attempt in Great Britain to grapple with the early treatment of mental disorder, to carry the teachings of mental hygiene into practical effect and to pursue research under the most favorable conditions into a subject concerning which, speaking comparatively, little is known and which up to the present time has been greatly neglected.

Women Members of the Medical Profession.—Since London Hospital and Medical College decided towards the end of 1921 not to admit medical female students in the future there has been a certain fear that other medical schools might follow their example with deplorable results. This fear has proved to be groundless, and a special inquiry made recently shows that adequate facilities are still offered in London University and its affiliated schools of medicine for the medical education of women. Courses for preliminary and intermediate medical studies are given at University College, King's College, Bedford College, East London College, the School of Medicine for Women and St. Mary's Hospital Medical School; and clinical education is provided at the following hospitals: Charing Cross, King's College, St. Mary's Royal Free, University College and Westminster. These hospitals together admitted 117 women students last October, 52 of them going to the Royal Free Hospital which only admits women students. No differentiation is shown by the hospital authorities against the women students in competition for first clinical appointments, although there is a tendency which in the case of Charing Cross Hospital has become a rule not to allow women's appointments to outnumber those of men.

Post Graduate Medical Teaching in London.—It is a somewhat curious fact that London, with all its wealth of clinical material, its numerous hospitals of every description, and its teachers of highest rank, has never been a centre for post-graduate medical training. In truth there has been little post-graduate medical training of any kind in the largest city of the world. However, after the war, when Berlin and

Vienna, the two most famous European post-graduate medical centres, were out of the running, at any rate, for the time being. Some of the medical men of London, headed by the late Sir William Osler, perceived that a unique opportunity had presented itself of making it the post-graduate medical centre of Europe. Steps were taken to bring this dream to reality and ambitious plans were started. But enthusiasm, organization and the necessary money seemed to be lacking, and now that more than three years have elapsed since the scheme was first suggested, it is discouraging to note that few of the original plans have been carried out. The past year has shown some advance. In February last the then Minister of Health announced that the Rockefeller Foundation had offered the sum of $2,000,000 towards the cost of building and equipping a Post-Graduate School of Hygiene. This offer was accepted by the Minister of Health, on the part of the Government, since which time, owing to the unsettled political situation, nothing further has been done. No doubt the success of the post-graduate medical schools of Berlin and Vienna depended largely on their methods of organization and it certainly is to be regretted that the London medical profession have not taken, or will not now take, a leaf out of their book and establish in London a post-graduate medical school, organized in a manner in keeping with its immense facilities, that it may attract post-graduate medical students from all parts of the world and especially Americans to whom a common language should prove a great inducement.

New Minister of Health.—The Ministry of Health since its foundation has not been too fortunate in its ministers, or perhaps it may be said that the ministers have been unfortunate in occupying the post. They have had to engineer the Housing Bill, the most difficult measure before the House of Commons. Dr. Christopher Addison, the first occupant, a medical man, as well as being a practised politician, failed to agree with Mr. Lloyd George on the housing question and was compelled to resign. Sir Alfred Mond, a shrewd business man, next accepted the post. It is not known if he would have weathered the storm as he had not been a minister long when a general election took place. Sir A. Griffith Boscawen was made minister in the new government, but he has been more unfortunate than any of his predecessors. He was not re-elected to the seat he was holding and has been defeated twice since. Of course, he has been compelled to resign his Cabinet appointment. Mr. Neville Chamberlain has consented to take the vacant post. The housing problem in this country is the most difficult domestic question. In the prevention of disease and in the preservation of good health no one factor is of so great importance as that of adequate and healthful housing. At the present time there is an abnormal scarcity of such habitations and the matter of building them simply bristles with difficulties. The new Minister of Health has no enviable task before him, but Mr. Neville Chamberlain's experience of municipal life in Birmingham will be of great value to him in the stormy weeks that lie ahead.

A CORRECTION.

Boston, March 26, 1923.

Mr. Editor:

In the editorial on Medical Education which appeared in the JOURNAL of March 22, I note one slight error. In considering the criticism of the views of Dr. Ryerson, the editorial says, "That from the Dean of Ann Arbor." The flippant remark with reference to Dr. Ryerson's scheme, implying unfair criticism, was not made by Dr. Cabot, Dean of the Medical School at Ann Arbor, but by another physician whose name has often been associated with the School of Medicine of the University of Michigan.

STEPHEN RUSHMORE.

BOVINE TUBERCULOSIS.

Mr. Editor:

In the recent combined meeting on the Milk Question, held at the Boston Medical Library, Dr. Crossman proved the infection of the glands in an enormous amount of cattle with bovine tuberculosis. He described the measures the government has adopted in checking its spread to the human family.

Dr. Wolbach proved that about one-fifth of tuberculous glands in children under six years of age is due to the infection with bovine bacilli. He has also proven that adults are not exempt from that infection.

Now this infection exists the country over, and all over the world, as proven by the researches quoted by the above speakers, of various men in different localities; except, Dr. Crossman tells us, that the infection of the cattle in some localities is not as prevalent as in others.

Now it would be interesting to know where do the bovines get the bovine bacilli.

Is it in the food, water, climate or dirt? They certainly have plenty of fresh air and sunshine most of the year.

Cannot the human, aside from the indisputable milk source, be infected with the bovine bacilli through the same avenues as the bovines themselves, if they have "the makings" for it?

It would also be interesting to know whether a good many of the diseased tonsils and adenoids are not primarily infected with bovine tuberculosis by ingestion. The bovine bacilli seem to have a predilection for glands.

JOSEPH PRENN.

A CRITICISM.

Mr. Editor:

"Quosque tandem abutere....." This ululation is provoked by the ever-recurring, hebdomadary insistence on psycho-analysis, and the wailer feels warranted in his wail, from the obligation of belonging to the society by which you are owned and published. Last week, in response to a layman's question on the unreality of things, and this week, in a book review, you go out of your way to relegate to a limbo what doesn't belong to your pet cult, and not with calm argument, or reasoned advocacy, but with a dogmatic, irritating, impudent characterization of every other psycho-therapeutic measure as pseudo-scientific. You say "all...even the so-called persuasion (why the gratuitous 'so-called') are dependent on suggestion," and that "suggestion, to be active at all, requires a special emotional state of mind." Now this, if language means anything, is quite simply not true. Again you assert "all suggestion is a form of medical magic" (with a side allusion to psycho-analytic definitions, which are about as unconstrained and easy to follow as Christian Science definitions); this second assertion is as grotesque as the first; to persuade a man who worries, and who, in consequence, develops intestinal-motor, and internal-secretion disturbances, that his worries are baseless, or useless, is not a matter of magic.

And, of course, there is no suggestion in the pretenses of the psycho-analyst! Let me allude to one standard case; a woman had an uncomfortable feeling in her breast, and a fear of cancer; she dreamt of a fierce man in a dark cellar, he wanted her valuables, he stabbed her; free association develops this choice product: dark cellar—concealed places—female genitals—(ah!)—he wanted her valuables—being stabbed in a dream is symbolic of coitus—(pleasant thought)—to be attacked by a fierce man proclaims her a masochist—etc., etc.; so the uncomfortable feeling was caused by this repressed desire in a conjectural unconscious, and the fear, by a struggle in an equally intangible and untenable foreconscious. And we are asked to believe that there is no element of suggestion in conferring on a respectable wo-

man such an aetiological diploma. And the propounders of this stuff presume to lecture as adherents of outworn "isms," those who maintain that what a man doesn't know won't trouble him; that repression is synonymous with civilization, not a cause of disease; who recognize that a neurotic has inability of adaptation, but prefer a physico-chemical explanation which permits their keeping their feet on the ground of human experience, rather than to "sky-hoot" after such fantastic chimera as "sexual and ego conflicts."

PHILIP KILBOY.

NOTE: The JOURNAL is always pleased to publish criticism of the material appearing in its columns. The phrase, "your pet cult," however, hardly applies to the attitude of the JOURNAL. In dealing with fundamental or scientific facts or theories we solicit editorials from writers who are regarded as leaders in the profession. We have no excuses or apologies to make for the statements which have irritated our esteemed correspondent. A statement is often "dogmatic, irritating or impudent" only as interpreted by a critic. Whether the articles referred to are dogmatic or irritating we will leave to our readers. We do resent emphatically the use of the word "impudent" as usually employed. If the writer meant to convey his interpretation of the articles as "not prudent, indiscreet or injudicious" we concede his right to use the word, but if he meant another dictionary definition, as given in the word "insolent," we take issue with him. We respectfully ask our readers to review the articles referred to and then reread the one above.

NATIONAL BOARD OF MEDICAL EXAMINERS.

March 19, 1923.

Mr. Editor:

Will you kindly publish in your JOURNAL the following information concerning examinations by the National Board of Medical Examiners.

Part I. June 25, 26, 27, 1923.
Part II. June 28, 29, 1923.
Part I. Sept. 24, 25, 26, 1923.
Part II. Sept. 27, 28, 1923.

All applications for these examinations must be made on or before May 15.

Further information may be obtained from the Secretary, Dr. J. S. Rodman, 1310 Medical Arts Building, Philadelphia, Pa.

J. S. RODMAN, *Secretary.*

TOUR TO THE MEETING OF THE AMERICAN MEDICAL ASSOCIATION.

In this issue Raymond & Whitcomb call attention to the three tours arranged for the accommodation of New England members of the A. M. A. An attractive circular of information has been distributed, setting forth the details of these tours. Any person contemplating going to San Francisco, who has not received a circular, should secure one for comparison with other offerings.

NOTICES.

UNITED STATES CIVIL SERVICE EXAMINATION.

The United States Civil Service Commission announces an open competitive examination for Junior Biochemist. The examination will be held throughout the country on April 25 to fill vacancies in the Public Health Service. At present there is a vacancy in the position of technical assistant in sanitary bacteriology, at Cincinnati, Ohio, at an entrance salary of $1,800 a year, plus the increase of $20 a month granted by Congress.

THE NEW ENGLAND SOCIETY OF PSYCHIATRY.

The New England Society of Psychiatry will hold its semi-annual meeting at the Foxboro State Hospital on April 11, 1923. Papers will be presented by Dr. O. J. Raeder and Dr. C. Macfie Campbell.

CASES REPORTED TO MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH.

WEEK ENDING MARCH 24, 1923.

Disease.	*No. of Cases.*	*Disease.*	*No. of Cases.*
Anterior poliomyelitis	1	Pneumonia, lobar	184
Chicken-pox	144	Scarlet fever	370
Diphtheria	167	Septic sore throat	2
Dog-bite requiring anti-rabic treatment	1	Suppurative conjunctivitis	5
Encephalitis lethargica	14	Syphilis	49
Epidemic cerebrospinal meningitis	2	Trichinosis	2
German measles	11	Tuberculosis, pulmonary	103
Gonorrhea	78	Tuberculosis, other forms	19
Influenza	74	Typhoid fever	12
Measles	760	Whooping cough	440
Mumps	253		
Ophthalmia neonatorum	16		

SOCIETY MEETINGS.

The annual meeting of the Massachusetts Medical Society will be held in Pittsfield, June 12 and 13.

DISTRICT SOCIETIES.

A list of society meetings is herewith published. This list will be changed or information furnished by the secretaries of the societies, and will appear in each issue.

Gloucester District—Hygiene, May 5, 1923.
Bristol North District—Annual Meeting at Taunton, April 26.
Bristol South District—Fall River, May 3, 1923.
Essex North District—Lawrence, Y. M. C. A. Building (Annual Meeting), May 2, 1923.

Meetings of the Suffolk District and the Boston Medical Library, at the Library:

April 26, 1923—Annual Meeting. Election of Officers. "The Record of the Past Twelve Years in Surgery, with a Forecast of the Future." A series of 10-minute papers. Dr. C. Morton Smith, Boston, will preside.

Middlesex East District:

April 18, 1923—Interpretation of Laboratory Findings. Papers by Dr. S. G. Crabtree and one to be announced later.
May 9, 1923—Annual Meeting.

The annual meeting of the Annual Meeting will be held at the Harvard Club in Boston. A. E. Small, Secretary.

Worcester District meetings are scheduled as follows:

April 11, 1923—The meeting will be held at Memorial Hospital at 8.15 P. M., and the program will consist of a series of cases by members of the staff.
May 9, 1923—Annual Meeting and banquet.

STATE, INTERSTATE AND NATIONAL SOCIETIES.

New England Pediatric Society: The following are the dates for meetings the coming season. Each meeting is on the second Friday of the month at the Boston Medical Library: April 13 and May 11.

April, 1923—New England Dermatological Society meeting, April 11, 1923, at 8 P. M., in the Surgical Amphitheatre, Boston City Hospital. C. Guy Lane, Secretary. Massachusetts Association of Boards of Health, April 25, 1923, Boston; W. H. Allen, Mansfield, Mass., Secretary.

April, 1923—Boston Medical History Club will meet the third Monday of this month.

April, 1923—Massachusetts Public Health Conference will be held in Springfield, April 23-27, inclusive. Dr. Eugene R. Kelley, Chairman.

May, 1923—Massachusetts Society of Examining Physicians (date and place undecided). American Pediatric Society meeting, May 31, June 1 and 2, 1923, at French Lick Springs Hotel, French Lick, Ind.; H. C. Carpenter, Secretary.

May, 1923—Boston Association of Cardiac Clinics. Meeting May 17, 1923, at 8.15 P. M., Children's Hospital. Subject: Rheumatism and Chorea and Heart Disease.

June, 1923—American Medical Association, San Francisco, June 25-29, 1923; Olin West, Chicago, Ill., Secretary.

July, 1923—Massachusetts Association of Boards of Health, July 26, Nantasket; W. H. Allen, Mansfield, Mass., Secretary.

October, 1923—Boston Health Show will be held in Boston, October 6-13, inclusive.

October, 1923—Meeting of the American Health Association will be held in Boston, October 8-13, inclusive.